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APPENDIX A

TITLE: LIVEEXCEPTION SYSTEM

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NETWORK HEALTH®

Customizing Variables

Developer Program

09-14020-003 June 2000

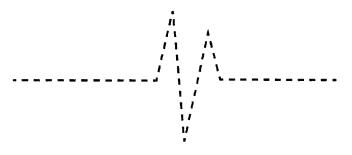


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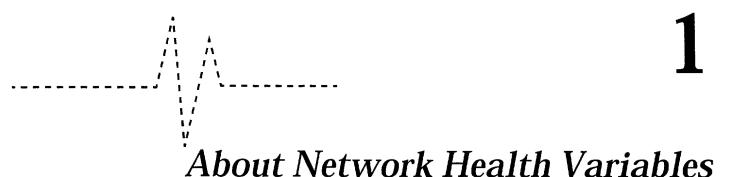
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Network Health uses a proprietary technology called the *management information base (MIB) translation file* (MTF). This technology allows Network Health to normalize data collected from standard and proprietary agents available from multiple vendors. By normalizing data, Network Health can reliably analyze data collected from different agents and vendors and display it in the same report using a standard set of labels.

About MIB Translation Files

For each type of element (such as Ethernet, Frame Relay, Asynchronous Transfer Mode (ATM), remote access devices, routers, and servers), Network Health assigns a set of variables to columns in the database. To make those assignments, it requires an MTF for each element that is to be polled at a device. For example, if the Simple Network Management Protocol (SNMP) agent at a device supports Ethernet, Fiber Distributed Data Interface (FDDI), Token Ring, and Frame Relay, Network Health requires an MTF for each element type.

Each MTF identifies the associated MIB and its filename, an agent for this element type, and a set of statements that map MIB variables to the appropriate database column. When an element is discovered, Network Health assigns the appropriate agent type to it. Network Health polls for data for the variables defined in the MTF only.

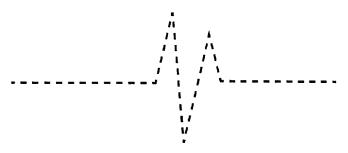
With an MTF, Network Health specifies only those MIB attributes used to generate reports. Often the information required for analysis exists in either a subset of a MIB table or in multiple MIB tables in the agent. Using an MTF, Network Health can combine data from different tables in the MIB that are indexed in the same way. In addition, an MTF can combine standard MIB information with proprietary extensions in a single poll.

Using the MTF technology, you can request that Network Health poll devices for specific variables, define the mapping to database columns for those variables, create the type of labels that you want to appear in reports, and run Trend reports on your variables. Refer to Chapter 2, "Creating an MTF," for instructions.

About Report Labels

For each element type, Network Health establishes a set of variable labels. A label is associated with each database column based on the element type. When you run Network Health, it displays the correct labels in reports and in lists for selecting variables on which to run Trend reports.

After creating an MTF, you can associate your variables with labels provided by Network Health or labels that you create. Network Health provides ASCII files that you can modify to create your own labels. Refer to Chapter 3, "Adding Variable Labels," for instructions.



Creating an MTF

To create an MTF, you must do the following:

- 1. Construct the MTF.
- 2. Create a compiled MIB.
- **3.** Add the agent that is assigned to the MTF to Network Health.
- **4.** Restart the Network Health server.

This chapter describes each of these steps in detail.

Constructing the MTF

An MTF describes the mapping of data from a source (such as a MIB, or data imported from a database data information (DDI) file) to the columns in the Network Health database. To construct an MTF, you can either edit an existing MTF to add your mappings or write a new MTF.

If you edit an existing MTF, every time you reinstall or upgrade Network Health, the installation process copies to the *nethealth*/changed directory any MTFs and compiled MIBs that you modified. You must copy them back to the poller directory. If you write a new MTF, reinstalling or upgrading Network Health does not affect your MTFs or compiled MIBs.

Network Health supports using indexes to access MIB variables. It only collects statistical data that is a counter or a gauge. This section describes assigning indexes to variables and how to define your data as either a counter or a gauge.

Writing an MTF

An MTF is an ASCII text file that uses nested statements (enclosed in braces) to define the set of attributes to use. It begins with the keyword mib and the name of the MIB being translated. Generally, you should use the name of the MIB as part of the MTF filename.

The MTF includes nested statements for the following types of information: support, data source, and translation. The following is a sample mib2.mtf file:

```
mib mib2
{
   file mib2.mib
   version 2
   agent "MIB2 (wan port)"
   translation
      mediaType = -100
      mediaSpeed = ifSpeed%
      operStatus = ifOperStatus%
      operStatusLastChange = ifLastChange%
      variable1 = ifInUcastPkts + ifInNUcastPkts +
ifInErrors + ifInDiscards + ifInUnknownProtos
      variable2 = ifInOctets
      variable3 = ifInNUcastPkts
      variable4 = ifInNUcastPkts + ifOutNUcastPkts
      variable10 = ifInErrors
      variable9 = ifInDiscards
      variable16 = ifInUnknownProtos
      variable22 = ifInUcastPkts + ifInNUcastPkts +
ifOutUcastPkts + ifOutNUcastPkts + ifInErrors + ifInDiscards
+ ifInUnknownProtos
      variable23 = ifInOctets + ifOutOctets
      variable24 = ifInErrors + ifOutErrors
      variable25 = ifInDiscards + ifOutDiscards
}
```

NOTE

To create your own MTF, you can copy and rename an existing MTF.

.......

Support Information

The support information section includes the following variable statements:

```
file mibFilename
version number
aggregateOnly value
agent "agentTextString"
```

Each variable is required and must have the appropriate value, as defined in Table 2-1.

Table 2-1: Support Information

Variable	Definition
file	The filename for the MIB being translated by this MTF. The corresponding filename.pcm file must reside in the poller directory of the Network Health installation.
version	The number of the MTF format. Only the value 2 is supported.
aggregateOnly	Indicates whether the element is a form of parent element that is not polled but exists for reporting and aggregation purposes. The default value is no.
	If set to yes, this statement indicates that the element is not polled, but it is used to collect aggregate data for children elements. Modem pools are an example of this type of element.
agent	The text for the agent that appears in the Poller Configuration dialog box. You must create a unique string for your MTF.

Data Source Information

The dataSourceInfo section of an MTF provides information concerning response elements (response paths). The data source information begins with the dataSourceInfo keyword followed by an open brace on a new line as follows:

```
dataSourceInfo
{
```

This section contains three variable statements in the following format:

```
dataSourceType
presVarListName
protocol
```

Each statement must occupy a single text line. These statements are required and must have the appropriate value.

The first variable, dataSourceType, indicates the kind of data that Network Health should expect to collect from the polled device. Using this variable, Network Health distinguishes among the protocol measurement capabilities of various kinds of routers. For data import purposes, you should set the value to NotApplicable.

The second variable, presVarListName, represents the value of the keyword in *nethealth*/poller/protocols.vars, which defines the data fields from which this MTF file is expected to extract necessary configuration information. Using this variable, Network Health determines which parameter variables are applicable to various kinds of routers. For data import purposes, you should set the value to *genericResponsePath*.

The last variable in the dataSourceInfo section, protocol, defines the protocol measured by elements of this type. This variable controls the protocols that you view in Network Health reports. Table 2-2 lists the valid values for each supported protocol.

Table 2-2.	Supported	Protocole	for dataS	aurealafa
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Protocol	Value
Ping	ICMP
UDP	UDP
DNS	domain
HTTP	www-http
TCP Connect	TCP
Jitter	Jitter
Sybase SQL	sybase
Oracle SQL	orasrv
Microsoft SQL	ms-sql-s
SAP-R3	sap-r3

.......

Table 2-2: Supported Protocols for dataSourceInfo (Continued)

Protocol	Value
Oracle Forms	oraforms
Lotus Notes	lotusnote
Microsoft Exchange	msexch-routing
PeopleSoft	peoplesoft
Citrix	ica
Mail (POP3)	pop3
Mail (SMTP)	smtp
Other Network Protocol	other-net
Other Application Protocol	other-app
Telnet	telnet
FTP	ftp
Other SQL	other-sql
Network News (NNTP)	nntp

Translation Information

The translation information section begins with the translation keyword followed by an open brace on a new line as follows:

```
translation
{
```

In the translation section, statements identify required information and map one or more MIB variables to a database column. The variable statements follow this format:

```
mtfVariable = expression
```

Each statement must occupy a single text line. Table 2-3 lists the variables used in the translation information section and their valid values .

Constructing the MTF

Table 2-3: Translation Information

Variable	Definition
mediaType	Specifies the type of element. This is required. If you are using an existing element type, specify one of the following values:
	6 Ethernet LAN -1 Token Ring LAN -2 MIB2 LAN -100 WAN -101 Frame Relay -102 MDBS -105 ATM Port -106 ATM Path -107 ATM Channel -200 Router -201 Router with Cache -250 Router CPU -251 Router CPU with Cache -300 Server -301 Server with no Virtual Memory -302 Server with no Memory -303 BMC Windows NT Server -304 BMC UNIX Server -305 Empire Windows NT Server -306 Empire UNIX Server -330 Server CPU -350 User Partition -352 BMC Windows NT Partition -353 BMC UNIX Partition -354 BMC UNIX Partition -355 Server Disk -371 BMC Server Disk -502 Server WAN -600 Server WAN -700 Modem
	-701 ISDN interface -725 Remote access server (RAS) -750 RAS CPU -775 Modem pool

Table 2-3: Translation Information (Continued)

 Network path Network path for voice over IP Network path for application protocols Network path element identifier for FirstSense Network path element identifier for Empire Service Response
John Traffic Accountant probe John System Partition John BMC Windows NT System Partition John BMC UNIX System Partition John UNIX Process Set John UNIX Process Set John UNIX Process Set John UNIX Process Set Excluded John UNIX Process Set Excluded John UNIX Process John UNIX Proces

Constructing the MTF

Table 2-3: Translation Information (Continued)

Variable	Definition
mediaSpeed	Specifies what the poller uses to obtain the interface speed. This is required. For full-duplex interfaces, this is the incoming interface speed. You can specify the speed as a value in bits per second or as the MIB variable. If the speed is in units other than bits per second, you must convert it in this statement. You should designate this as a gauge by including a percent sign (%).
mediaSpeedOut	Specifies what the poller uses to obtain the outgoing interface speed. This is used only for full-duplex interfaces. You can specify the speed as a value in bits per second or as the MIB variable. If the speed is in units other than bits per second, you must convert it in this statement. You should designate this as a gauge by including a percent sign (%).
operStatus	Specifies the MIB variable (such as ifOperStatus) the poller uses to obtain the interface operational status. This is optional. You should designate it as a gauge by including a percent sign (%).
	Network Health interprets data for this variable based on the ifOperStatus enumeration from MIB.
operStatusLastChange	Specifies the MIB variable the poller uses to obtain the last operational status change. This is optional and should be designated as a gauge by including a percent sign (%).
	Network Health interprets data for this variable based on the ifLastChange enumeration from MIB2.
sysUpTime	Specifies the MIB variable that the poller uses to obtain the system uptime. This is optional and should be designated as a gauge by including a percent sign (%).
availableTime	Specifies the amount of time in seconds that the element is available for the duration of the current polling interval.
	If this variable is present, the availability data will be based on this value rather than calculations based on ifOperStatus, ifLastChange, and sysUpTime.
reachableTimeSec	Specifies the sum of the response time, the amount of time in seconds that the element was reachable.

Variable	Specifies the time in milliseconds that it took for the roundtrip delay to reach the element.	
latencyMsec		
totalTime Specifies the total amount of time during velement was polled. For data import purportotalTime and deltaTime variables are equipole.		
ariable N Specifies the actual MIB variable or variable mapped to the column identified as variable variable30.		

Table 2-3: Translation Information (Continued)

Rules Concerning the Creation of MTFs

When creating an MTF, keep in mind the following:

- When specifying the mediaSpeed variable for any element that does not support the concept of speed (such as a router or server disk), you must specify zero (0). Do not leave the value blank.
- You must include every MIB variable for which you want data collected, not just your specific variables.
- Before you specify a variable *N*, make sure that it is available for your use. Refer to Appendix A for a list of column assignments for variables.
- The variables that you select to include in the MTF must be indexed in the same way.
- You can specify only the following operators in the MTF: plus (+), minus (-), multiply (*), and divide (/).
- Both the translation information and the MTF must end with a close brace (}), preferably on a new line.

N	07	-=
1.4	v	_

You must have two close braces () at the end of the file.

Using Indexes to Access Variables

Network Health supports up to four indexes in the poller configuration. You can use these indexes to access your variables by appending the index number to the MIB variable name. For example, if you wanted to access the ifInOctets variable at index 12, you might specify the following:

variable28 = ifInOctets.12

Constructing the MTF

Indexes do not have to be constants. Network Health supports the notation \$1, \$2, \$3, or \$4 to indicate an index as defined in the poller configuration. For example, if index 1 in the poller configuration is index 12, you might specify the following:

variable28 = ifInOctets.\$1

Network Health assumes index1 if you do not include an index with the variable name. The following statement is identical to the one described previously:

variable28 = ifInOctets

If your MIB variable does not support indexes, you must append a zero to the variable name. For example:

variable30 = bufferNoMem.0

NOTE -

The index number does not imply order of use.

Using Counters and Gauges

Network Health only collects statistical data on two data types: counters and gauges. A counter is a non-negative integer which monotonically increases until it reaches a maximum value, after which it wraps around and starts increasing again from zero. A gauge is a non-negative integer which may increase or decrease. By default, Network Health assumes that the data type for a variable is a counter unless you indicate that it is a gauge by appending a percent sign (%) to the variable.

Network Health does not handle counters and gauges in the same way. Each time that it polls a counter, it subtracts the value of that counter in the previous poll interval from its value in the current poll interval to obtain a counter difference, which it stores in the database. It subsequently divides the database value by the polling interval to obtain a rate.

In contrast, when Network Health polls a gauge, it stores the gauge directly in the database without performing a subtraction. When polling a report gauge, it subsequently divides the report gauge by the poll period. When polling a calculation gauge, it does not multiply the calculation gauge by the poll interval.

••••••

When collecting data for a gauge, you must normalize it to a counter before Network Health can store it in the database. This is a requirement for the database rollups. To normalize a gauge to a counter, you must multiply the value returned for the variable by the time between the last poll and the current poll, which is represented by the deltaTime MTF variable, divided by 100. For any variable that specifies a gauge for a data type, you express that variable as follows:

```
gaugeVariable% * (deltaTime / 100)
```

The deltaTime MTF variable is expressed in centiseconds, and the database requires units in seconds.

Using Function Call Syntax in an MTF Expression

The MTF expression language supports function call syntax. Functions have the following format:

```
functionName (argl, ..., argn)
```

MTFs support the following defined functions:

- round
- switch
- constArrayMap
- counter64
- nwbCounter64
- snmpCounter64
- useWrappedValue
- · isAggregated
- min
- max
- · null data

The round Function

The round function has the following syntax:

```
round (x)
```

The value of x is a variable. This function rounds the value of x to the nearest integer. For example:

Constructing the MTF

- round (22.2) = 22
- round (22.87) = 23
- round (42.5) = 43

The switch Function

The switch function has the following syntax:

```
switch (x, d1, r1, ..., dn, rn)
```

The values of x, dl, and rl may be any expressions. This function is a general quality-based conditional. It evaluates x and compares the result for equality with the evaluated values of dl, dl, and so on, in succession, until it finds a match. When it finds a match, the switch function returns the evaluated value ri (r1, r2, and so on). If it does not find a match, it returns 0.

The constArrayMap Function

The constArrayMap function has the following syntax:

```
constArrayMap (x, c0, c1, ..., cn-1)
```

This function maps one set of values to another set of variable values. It truncates the value of x to an integer, if necessary, and uses the integer value as an index to the set of constants shown as c0, c1, up to cn-1. The c values must be constants. The function checks these values when the MTF is parsed and returns c[x].

NOTE -

You must have a constant for each possible value of x, otherwise, Network Health generates a runtime error. If x is not in the domain from 0 to n-1, the result is 0.

For example:

variable = constArrayMap(x,12,4,7,22,40)

When x is 0.25, the function truncates the value to 0. The 0 index value in the constant array is 12; thus, the *variable* value evaluates to 12. When x is 1, the value is 1. The 1 index value in the array is 4; thus, the *variable* value evaluates to 4.

The counter64 Function

The counter64 function has the following syntax:

```
counter64 (hi, lo)
```

The value of *hi* is the high 32 bits of a 64-bit counter value and the value of *lo* is the low 32 bits of a 64-bit counter value.

Network Health obtains the high and low portions of the 64-bit counter from different MIB variables and concatenates them to form a single 64-bit value. It then uses this value to calculate deltas (without loss of precision). As with 32-bit counters, Network Health checks the wrap. If it detects a delta greater than half the word resolution (in this case, a delta greater than 2^{63} - 1 = 9223372036854775807), it generates a wrap error.

The nwbCounter64 Function

The nwbCounter64 function has the following syntax:

```
nwbCounter64 (x)
```

The value of *x* must be a variable. This function interprets the value of *x* as a Newbridge octet-string based 64-bit counter. In contrast to the snmpCounter64 function, you must use this function to denote this type of counter. Since the use of an octet string as a counter is nonstandard, if the type is not octet-string—and a Newbridge 64-bit counter is the variable to which the value is to be bound—the poller checks the returned SNMP type in the response packet and generates an error.

The setSnmpVersion Function

The setSnmpVersion function sets the SNMP version of the packets sent by the poller. By default, all packets are SNMP version 1. If your device requires a different SNMP version, you can use the setSnmpVersion function to specify it in the MTF file for the device.

The setSnmpVersion function has the following syntax:

```
setSnmpVersion (version)
```

The value of version can be 1, 2, 2c, or 3.

The snmpCounter64 Function

The snmpCounter64 function has the following syntax:

```
snmpCounter64 (x)
```

The value of *x* must be a variable. This function interprets the value of *x* as an SNMPv2 64-bit counter. It is an optional function because it is dependent on the agent. If 64-bit SNMPv2 counters appear in a MIB, and they are properly tagged as such in the response SNMP packet, the poller reports on them correctly.

The useWrappedValue Function

The useWrappedValue function has the following syntax:

```
useWrappedValue (x)
```

The value of x must be a variable. This function compares the current value of x to its value at the previous poll. If x is lower than that value, the function evaluates it to the absolute value of x. If x is higher than that value, the function evaluates it to the difference of the current value minus the value at the previous poll.

The isAggregated Function

The isAggregated function has the following syntax:

```
VarN = isAqqreqated ()
```

The isAggregated function specifies that this MTF variable is an aggregation of data from another element (such as a child element). It is a marker that denotes which columns are defined and aggregated internally by the poller. Its presence or absence has **no** effect on the data being placed in the database. Instead, isAggregated marks columns in the MTF that would not otherwise be specified so reports that reference the column will know the column is valid. Within the MTF, you can **remove** the isAggregated statement from a variable, thus making that variable untrendable for the parent. You should never add isAggregated to a variable that is not already marked that way in another MTF of the same media type. The only option is to remove isAggregated, which should be done when a device does not support the aggregated column.

If you are defining a new parent element based on an existing element type, you can mimic the current aggregation schemes, specify another variable instead, or remove the aggregation scheme. You cannot add is Aggregated to a variable that was never aggregated in the parent type that you are modeling.

The min function

The min function has the following syntax:

```
min(x, y)
```

The values of *x* and *y* may be any expressions. This function returns the minimum value of *x* and *y*.

The max function

The max function has the following syntax:

```
\max(x, y)
```

The values of x and y may be any expressions. This function returns the maximum value of x and y.

The nullData Function

The nullData function has the following syntax:

```
variable = nullData()
```

This function interprets any variable as null that is missing from the MTF, but that the poller collects by default. For example, the poller cannot measure an import element if it does not have a definition in the import data file. The nullData function interprets the import element as null to ensure that the poller does not report on it.

Compiling MIBs

Network Health uses a precompiled MIB (PCM) file to determine the MIB variables for which you want to collect data during the poll. A PCM file contains the name and object identifier (OID) for the variables that are defined in all MTFs that reference the MIB. In addition, each PCM file contains additional variables required by Network Health to discover and poll the element.

For example, the PCM file for the mib2.mib is as follows:

```
hrDeviceErrors 1.3.6.1.2.1.25.3.2.1.6
hrDiskStorageCapacity 1.3.6.1.2.1.25.3.6.1.4
hrMemorySize 1.3.6.1.2.1.25.2.2
hrProcessorLoad 1.3.6.1.2.1.25.3.3.1.2
hrStorageAllocationFailures 1.3.6.1.2.1.25.2.3.1.7
hrStorageAllocationUnits 1.3.6.1.2.1.25.2.3.1.4
hrStorageSize 1.3.6.1.2.1.25.2.3.1.5
hrStorageUsed 1.3.6.1.2.1.25.2.3.1.6
hrSystemNumUsers 1.3.6.1.2.1.25.1.5
ifInDiscards 1.3.6.1.2.1.2.2.1.13
ifInErrors 1.3.6.1.2.1.2.2.1.14
ifInNUcastPkts 1.3.6.1.2.1.2.2.1.12
ifInOctets 1.3.6.1.2.1.2.2.1.10
ifInUcastPkts 1.3.6.1.2.1.2.2.1.11
ifInUnknownProtos 1.3.6.1.2.1.2.2.1.15
ifLastChange 1.3.6.1.2.1.2.2.1.9
ifOperStatus 1.3.6.1.2.1.2.2.1.8
ifOutDiscards 1.3.6.1.2.1.2.2.1.19
ifOutErrors 1.3.6.1.2.1.2.2.1.20
ifOutNUcastPkts 1.3.6.1.2.1.2.2.1.18
ifOutOctets 1.3.6.1.2.1.2.2.1.16
ifOutUcastPkts 1.3.6.1.2.1.2.2.1.17
ifSpeed 1.3.6.1.2.1.2.2.1.5
ipForwDatagrams 1.3.6.1.2.1.4.6
```

To compile your MIB, you can edit the existing PCM file for your MIB or use the nhCompileMib command.

Editing the PCM File

If you are creating an MTF for which a PCM file was supplied, you must edit the PCM file only. However, before you reinstall or upgrade Network Health, you should make a copy of this PCM file.

To edit an existing PCM file, you add the name and OID of your variable. The OID must include the indicator for the table in which the variable resides and the indicator for the instance of that variable. For example, the variable ifInOctets is the tenth instance in table 1:

```
ifInOctets 1.3.6.1.2.1.2.2.1.10
```

Note -----

The OID for your variable must use the SNMPv1 format.

Using the nhCompileMib Command

To use the nhCompileMib command:

- 1. Make sure that both your MTF and MIB files are in / nethealth/poller.
- **2.** Optionally, use one of these commands to source the Network Health resource file that is appropriate for your shell environment

Table 2-4: Commands Used to Source Network Health
Resource Files

Shell	Command
Bourne	. nethealthrc.sh
С	source nethealthrc.csh
Korn	. nethealthrc.ksh

Note -

If you do not source the resource file, change to the /nethealth/bin directory or specify that directory in your Network Health commands.

3. Enter the following command:

nethealth/bin/nhCompileMib -a mibFile.mib > & mibFile.mib.pcm

NOTE

You must include the ampersand (&) with the redirect (>).

The resulting PCM file contains all OIDs from both your MIB file and the /nethealth/poller/nhCommonMib file.

If you have difficulty compiling the MIB, you must edit it to remove or change offending lines. Some vendor's MIBs do not easily compile unless you edit the file. You should delete any tables or individual variables from the MIB that your MTF does not need.

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Adding Agents to the List of Agent Types

Specifying Null Data

If the agent type for an MTF does not support a variable, the poller will still report on it by default, assigning it a value of zero. However, if you assign "null data" to an MTF variable, Network Health disregards it when polling. As a result, in the Trend report, Network Health does not present the variable as valid. Rather than assigning a value of 0 to the data, it considers the data to be nonexistent.

If you do not define variables 1 through 30 for a given MTF, Network Health considers them to be null data. If you omit them from the file, it considers them to be invalid for elements assigned to that MTF. However, it interprets the latencyMsec and availableTime variables differently. Network Health assumes that all polled elements support the values for these functions. Therefore, by default, it considers their data to be valid.

If a device does not support the latencyMsec or availableTime variable, you must assign null data to the appropriate variable in the MTF using the following syntax:

```
latencyMsec = nullData()
availableTime = nullData() + deltaTime/100
```

NOTE -

Since Health reports do not support the null data feature, the MTF assigns a default value of zero to the nullData() function. Therefore, you must append the additional calculation to the availableTime variable to prevent Health reports from generating exceptions for an availability of zero.

Adding Agents to the List of Agent Types

After constructing the MTF, you must add the agent that you defined to the list of agent types in /nethealth/poller/agent.types. Network Health uses this file to provide the agents for the Poller Configuration, Modify Element, and Add Element dialog boxes.

NOTE -

If you reinstall or upgrade Network Health, follow this procedure to add your agents to the agent.types file.

To add an agent:

- 1. Change to the / nethealth/poller directory.
- **2.** Rename the agent.types file as agent.types.bak to retain the previous version.
- **3.** If you are adding a response path MTF, delete or rename the dataSourceInfo.ddi file.
- **4.** Quit the Network Health console. Select **Console** \rightarrow **Quit**.
- 5. Restart the console using the nethealth command. Network Health automatically recreates the agent.types and the dataSourceInfo.ddi files.

Polling Your Elements

Before you can poll the elements for which you created an MTF, you must perform the following tasks:

- Restart the Network Health server.
- Assign the newly created agents to your elements.
- Add your elements to the poller configuration.

Restarting Network Health

After creating an MTF, you must restart your Network Health server by following these steps:

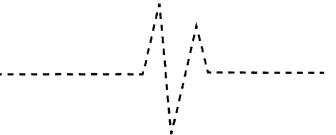
- 1. Stop the Network Health server. Select Console \rightarrow Stop Server.
- 2. Restart the Network Health server. Select Console → Start Server.

Assigning Agents to Elements

For Network Health to collect and store data relating to the variables that you defined in your MTF, you must assign your new agent type to each element. Use the Poller Configuration dialog box to modify the agent type of existing elements. Refer to the *Network Health User Guide* for instructions on modifying elements. If you have created your own element type, Network Health cannot locate your elements during the discover process. However, it might locate those elements using a different agent type.

Adding Elements to the Poller Configuration

If your elements do not appear in the Poller Configuration dialog box, you must add your elements. Refer to the *Network Health User Guide* for instructions on adding elements. To create variable labels for use in Network Health Trend reports, refer to Chapter 3.



Adding Variable Labels

To make your variables available to Network Health reports, you need to add labels for these variables to the Network Health database. You can modify four files to add labels and then update the database using the nhConvertDb command. This chapter describes how to modify these four files.

Modifying User Files

To add labels to the database, Network Health provides the following four files, located in /nethealth/db/data:

- elementType.usr
- · columnExpression.usr
- · variable.usr
- elementTypeVariable.usr

By default, each of these files does not contain any data. Network Health provides a .sys version of each file that contains the default labels used by Network Health.

Note -

Do not modify the .sys files. To add your labels, you must modify the .usr files.

When modifying the .usr files to add variable labels, keep in mind the following rules:

- Always place a vertical bar (|) between fields.
- Do not place a vertical bar within the data or at the end of the row.
- Always enter a value in each field; fields cannot be blank.
- Do not use tabs; tabs are not supported.
- Always end the last entry with a single carriage return. Do not add any blank lines to the file.
- To add your variable labels to the database, you may not need to modify all of the files.

The remainder of this section describes the .usr files and explains when and how to modify them.

Modifying the elementType.usr File

You only need to add an entry in the elementType.usr file if you are creating a new element type (that is, if you specified a user value for the mediaType statement in your MTF).

For each new element, you must add an entry in the elementType.usr file. This file associates your element type with a standard Network Health element type.

Note -

You do not need to add entries to the elementType.usr file if you are not creating a new element.

Table 3-1 lists the elementType.usr fields and their required values.

Table 3-1: The elementType.usr Fields

Description	
The value that you assigned the mediaType variable in your MTF.	
The Network Health element type to associate with your element type. Specify one of the following values:	
0 Ethernet LAN 1 Token Ring LAN 2 MIB2 LAN 100 WAN 101 Frame Relay 102 MDBS 105 ATM Port 106 ATM Path 107 ATM Channel 200 Router 201 Router with Cache 250 Router CPU 251 Router CPU with Cache 300 Server 301 Server with no Virtual Memory 302 Server with no Memory 303 BMC Windows NT Server 304 BMC UNIX Server 305 Empire Windows NT Server 306 Empire UNIX Server 330 Server CPU 350 User Partition 352 BMC Windows NT Partition 353 BMC UNIX Partition 354 BMC UNIX Partition 355 Empire UNIX Server 366 Empire UNIX Server 377 Server Disk 378 BMC UNIX Partition 379 Server Disk 370 Server LAN 370 Modem 370 ISDN Interface 375 Remote Access Server 375 RAS CPU 3775 Modem Pool	

The elementType.usr Fields

Table 3-1: The elementType.usr Fields (Continued)

Field	Description	
RPT_ALIAS_PITEM_TYPE (continued)	800 Network Path 803 FirstSense 805 Empire Service Response 825 Application Client 900 Application Server 1000 Traffic Accountant Probe 3000 System Partition 3001 BMC NT System Partition 3002 BMC UNIX System Partition 3100 UNIX Process Set 3101 NT Process Set 3200 UNIX Process Set Excluded 3201 NT Process Set Excluded 3300 UNIX Process 3301 NT Process	
ELEMENT_CLASS	Specify 1.	
LABEL	A label for the element. You can specify up to 32 characters.	
WEB_LABEL	A label for the element in the Web interface for the list of elements in the Run Trend Report page. You can specify up to 64 characters.	

The element Type.usr file should contain fields with a format that is similar to those in the element Type.sys file, as shown in this example: $\frac{1}{2}$

0 0	1 Ethernet	Ethernet
1 1	1 Token Ring	Token Ring
2 100	1 MIB2LAN	MIB2 Lan Port
100 100	1 WAN	WAN
101 101	1 Frame Relay	Frame Relay
105 100	1 ATM Port	ATM Port
106 101	1 ATM Path	ATM Path
200 200	1 Router	Router/Switch
201 201	1 Router	Router with 1 CPU

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Network Health uses the elementType files to determine the element type to use for your element when generating reports and displaying in list form, such as lists for groups. In the above file, MIB2 LAN has an ELEMENT_TYPE of 2 and RPT_ALIAS_PITEM_TYPE of 100, which is a WAN element type. Network Health uses a WAN element type for all MIB2 LAN elements.

To add an entry for your element:

- 1. In the first field, specify the value (without a minus (-) sign) that you assigned to mediaType in your MTF.
- **2.** In the second field, associate your element type with a standard Network Health element type.
- 3. In the third field, specify 1.
- 4. In the fourth and fifth fields, create appropriate labels for your element. If you are creating your own element type, provide a unique Web label so that Network Health can display your element in lists (such as Trend reports) on the Web.

Modifying the variable.usr File

To create a unique label for variables in your MTF, you must add an entry in the variable.usr file. This label appears in the list of variables for running a Trend report on your element type. You can use existing Network Health labels that are defined in the variable.sys file for your variables.

Table 3-2 lists the variable usr fields and their required values.

NOTE -

You do not need to add entries to the variable.usr file if you are using existing variable labels.

Table 3-2: The variable usr Fields

Field	Description
VAR_ID	A unique number to identify the variable. Specify the following ranges:
	Original Equipment Manufacturer (OEM): 900,000 up to 1,000,000
	End-user: 1,000,000 and above

Table 3-2: The variable.usr Fields (Continued)

Field	Description	
UNITS_ID	A number indicating the type of units used to measure this variable. Specify the following values:	
	1 Bytes as a counter 2 Frames as a counter 3 Errors as a counter 4 Percent as a gauge 5 Per second as a gauge 6 Buffers as a gauge 7 Bytes as a gauge 8 Cells as a counter 9 Pages as a gauge 10 Total time as a gauge 11 Milliseconds as a gauge 12 Per call minute as a gauge 13 Gauge as a gauge 14 Bits per call second as a counter 15 Bits as a counter 16 Minimum milliseconds as a gauge 17 Maximum milliseconds as a gauge 18 Transactions as a counter 19 Size as an aggregate value that can be either an average (for gauge percentage values) or a total (for counter values)	
LABEL	A label used to identify the variable in a list. You can specify up to 32 characters. Spaces are permitted.	
SHORT_LABEL	A shorter label for the variable. You can specify up to 16 characters. Spaces are permitted.	
SYMBOL	An internal identifier for the variable. It must be unique for the element type. You can specify up to 32 characters. Spaces are not permitted.	

The variable usr file should contain fields that are similar in format to the variable sys file, as shown in the following example:

1	2 Frames	Frames	frames
2	1 Bytes	Bytes	bytes
3	2 Broadcasts	Broadcasts	broadcasts
4	2 Multicasts	Multicasts	multicasts
5	2 Alignment Errors	Alignment Errors	alignmentErrors
6	2 Collisions	Collisions	collisions
7	2 Errors	Errors	errors
8	2 TR Abort Errors	TR Abort Errors	abortErrors
9	2 TR Burst Errors	TR Burst Errors	burstErrors

Add an entry in the variable.usr file only for those variables for which you want to create your labels.

To add an entry:

- 1. In the first field, assign each variable a VAR_ID using the ranges listed in Table 3-2.
- 2. In the second field, indicate the type of units for measuring the data.
- 3. In the third field, create a label that is unique for your element type. You can specify up to 32 characters. This label appears in the list of available variables in the Run Trend Report dialog box when your element is selected.
- **4.** In the fourth field, specify the same label, but truncate it to 16 characters.
- 5. In the fifth field, specify the same label, but omit spaces and begin with a lowercase letter. The label you enter in this field must also be unique for your element type.

Modifying the columnExpression.usr File

The columnExpression files identify a column or a formula for the data that you are storing in the database. Add entries in the columnExpression.usr file only if you want to use a formula such as a variable derivative for your data. You do not need to add entries to this file if you are only storing data in one of the columns that is available for your use. For example, if you want to store the total number of bytes, you could create a column expression that uses the following formula:

BYTES IN+BYTES OUT

The columnExpression.usr Fields

NOTE -

The above formula is an existing column expression with a column ID (COL_ID) of 85 in the columnExpression.sys file.

Table 3-3 lists the columnExpression.usr fields and their required values.

Table 3-3: The columnExpression.usr Fields

Field	Description
COL_ID	A number to identify the column. If you are creating your own column expressions, specify these ranges:
	OEM: 900,000 up to 1,000,000 End-user: 1,000,000 and above
COL_EXPRESSION	A string of up to 255 characters that describe the column or the formula for the data.

The columnExpression.usr file should contain fields that are similar in format to the columnExpression.sys file, as shown in the following example.

- 30 BYTES_OUT
- 31 DLL TRANSITS+DLL ENET FRAMES
- 32 DLL_ERRORS-DLL_COLLISIONS
- 33 | (TR_LOST_FRAME-DLL_FRAMES) TR_BURST-TR_CONGESTION-TR_CONT ENTION_STREAMI
- 34 | (FLOAT4 (TR_CONTENTION_STREAMING) / FLOAT4 (TR_BIT_STREAMING)) *DELTA TIME*1
- 43 UTIL

NOTE

You can include combinations of variables in the COL_EXPRESSION string, similar to Columns 31 through 34 in this example.

The COL_ID associates a variable with a column expression in the database. If you are just using one of the 30 columns and do not need a formula, you do not need to create an entry in the columnExpression.usr file. Refer to Table A-1 on page A-2 for a list of the column IDs for variable1 through variable30 and the associated column expression.

If you want to add an entry to the columnExpression.usr file, select an identifier using the range listed in Table 3-3. You can use the columnExpression.sys file as a template for creating your column expression.

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Modifying the elementTypeVariable.usr File

The elementTypeVariable.usr file associates your variable with an element type, a variable ID, and a column. You **must** create an entry in the elementTypeVariable.usr file for each variable that you created in your MTF. Table 3-4 lists the elementTypeVariable.usr fields and their required values.

Table 3-4: The elementTypeVariable.usr Fields

Field	Description
ELEMENT_TYPE	The element identifier from either the elementType.sys or the elementType.usr file.
VAR_ID	The variable identifier from either the variable.sys or the variable.usr file for the variable.
DATA_SRC	Specify 1.
COL_ID	The column identifier from either the columnExpression.usr file for the variable.

The elementTypeVariable.usr file should contain fields that are similar in format to the elementTypeVariable.sys file, as shown in the following example:

0	1	1	1
0	2	1	2
0	3	1	4
0	4	1	3
0	5	1	11
0	6	1	9
0	7	1	10
0	118	1	57
0	119	1	58
0	120	1	59
0	121	1	60

To add entries:

1. For the first field, select an existing element type from the elementType.sys file. If you are creating elements, you must specify the ELEMENT_TYPE value that you added to the elementType.usr file.

The elementTypeVariable.usr Fields

- **2.** For the second field, specify the variable ID from the variable.sys file. If you created your own variable label, specify the VAR_ID that you created in the variable.usr file.
- 3. For the third field, specify 1.
- **4.** For the fourth field, specify a column ID from the columnExpression.sys file if you are using an existing column expression. For example, if you assigned your MIB variable to variable 26, specify 26 for the COL_ID. If you create a column expression for a formula, specify the COL_ID that you added to the columnExpression.usr file.

Updating the Database

To update the Network Health database with your changes to the label tables, you use the nhConvertDb command. The command has the following syntax:

nhConvertDb database

The database variable specifies the name of the database to convert. This is required.

To run the nhConvertDb command:

- 1. Stop the Network Health server. Select Console \rightarrow Stop Server.
- **2.** If you used the default database name, nethealth, enter the following command:

/nethealth/bin/nhConvertDb nethealth

3. When the database conversion finishes, restart the Network Health server. Select Console → Start Server.



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Database Column Assignments

Each type of element has a set of database columns that are fixed and reserved for Network Health, a set of database columns reserved for use by original equipment manufacturers (OEM) or third parties, and a set of database columns reserved for users. OEMs and users can add their own variables (such as error- free seconds) to the second and third sets of columns.

For the following element types, the tables in this appendix list the database columns (by MTF variable name) and the purpose of each. Variables not reserved by Network Health are available to OEMs or users.

- Ethernet
- Token Ring
- WAN
- MIB2 LAN and MIB2 LAN Full Duplex
- Frame Relay
- ATM Ports
- ATM Paths
- ATM Channels
- Routers
- · Router CPUs
- Servers
- Server CPUs
- Server Partitions
- Server Disks
- Server Interfaces
- Server Process Sets
- Remote access server (RAS) devices

- Modem pools
- Modems
- ISDN interfaces
- Network paths
- Network paths for DNS
- Network paths for HTTP
- · Network paths for voice over IP
- · Network Paths for FirstSense
- Network Paths for Empire Service Response

In addition, Table A-1 lists the column IDs and the associated column expressions for variable1 through variable30 as defined in the columnExpression.sys file.

Table A-1: Column IDs and Column Expression

COL_ID	COLUMN_EXPRESSION
1	DLL_FRAMES
2	DLL_BYTES
3	DLL_MCASTS
4	DLL_BCASTS
5	DLL_RCV_OFF_FRAMES
6	DLL_XMT_OFF_FRAMES
7	DLL_TRANSITS
8	DLL_ENET_FRAMES
9	DLL_COLLISIONS
10	DLL_ERRORS
11	DLL_ALGN_ERRORS
12	TR_SET_RECOVERY_MODE
13	TR_SIGNAL_LOSS
14	TR_BIT_STREAMING
15	TR_CONTENTION_STREAMING
16	TR_LINE

Table A-1: Column IDs and Column Expression (Continued)

COL_ID	COLUMN_EXPRESSION
17	TR_BURST
18	TR_INTERNAL
19	TR_ABORT
20	TR_ADDRESS_COPIED
21	TR_CONGESTION
22	TR_LOST_FRAME
23	TR_TOKEN
24	TR_FREQUENCY
25	TR_FRAME_COPIED
26	TR_LLC_FRAMES
27	PACKETS_IN
28	BYTES_IN
29	PACKETS_OUT
30	BYTES_OUT

Table A-2: Column Allocations for Ethernet Elements

MTF Variable	Description
variable1	Number of frames
variable2	Number of bytes
variable3	Number of multicasts
variable4	Number of broadcasts
variable5	Available for OEM use
variable6	Available for OEM use
variable7	Available for OEM use
variable8	Available for OEM use
variable9	Number of collisions
variable10	Number of errors

Table A-2: Column Allocations for Ethernet Elements (Continued)

MTF Variable	Description
variable11	Number of alignment errors
variable12	Number of non-unicast frames (in)
variable13	Number of deferred frames (out)
variable14	Number of discards total (in+out)
variable15	Reserved
variable16	Number of unknown protocol packets
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	Reserved
variable21	Reserved
variable22	Number of frames (in)
variable23	Number of bytes (in)
variable24	Number of errors (in)
variable25	Number of discards (in)
variable26	Available for use
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-3: Column Allocations for Token Ring Elements

MTF Variable	Description
variable1	Number of frames
variable2	Number of bytes
variable3	Number of multicasts
variable4	Number of broadcasts

Table A-3: Column Allocations for Token Ring Elements (Continued)

MTF Variable	Description
variable5	Available for OEM use
variable6	Available for OEM use
variable7	Available for OEM use
variable8	Available for OEM use
variable9	Available for OEM use
variable10	Number of errors
variable11	Available for use
variable12	Number of Token Ring Beaconing Event 1
variable13	Number of Token Ring Beaconing Event 2
variable14	Number of Token Ring Beaconing Event 3
variable15	Number of Token Ring Beaconing Event 4
variable16	Number of Token Ring soft error type 1
variable17	Number of Token Ring soft error type 2
variable18	Number of Token Ring soft error type 3
variable19	Number of Token Ring soft error type 4
variable20	Number of Token Ring soft error type 5
variable21	Number of Token Ring soft error type 6
variable22	Number of Token Ring soft error type 7
variable23	Number of Token Ring soft error type 8
variable24	Number of Token Ring soft error type 9
variable25	Number of Token Ring soft error type 10
variable26	Number of Token Ring logical link frames
variable27	Number of frames inbound on an interface
variable28	Number of bytes inbound on an interface
variable29	Number of frames outbound on an interface
variable30	Number of bytes outbound on an interface

Table A-4: Column Allocations for WAN Elements

MTF Variable	Description
variable1	Number of frames (in)
variable2	Number of bytes (in)
variable3	Number of non-unicast frames (in)
variable4	Number of non-unicast frames (in+out)
variable5	Available for OEM use
variable6	Available for OEM use
variable7	Number of queue drops (in)
variable8	Number of queue drops (out)
variable9	Number of discarded frames (in)
variable10	Number of all errors (minus discards) (in)
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Number of unknown protocols (in)
variable17	Available for OEM use
variable18	Reserved
variable19	Reserved
variable20	Reserved
variable21	Reserved
variable22	Number of frames (in+out)
variable23	Number of bytes (in+out)
variable24	Number of all errors (minus discards) (in +out)
variable25	Number of discarded frames (in+out)
variable26	Available for OEM use
	· · · · · · · · · · · · · · · · · · ·

Table A-4: Column Allocations for WAN Elements (Continued)

MTF Variable	Description
variable27	Available for OEM use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-5: Column Allocations for MIB2 LAN and MIB2 LAN Full Duplex Elements

MTF Variable	Description
variable1	Number of frames (in)
variable2	Number of bytes (in)
variable3	Number of non-unicast frames (in)
variable4	Number of non-unicast frames (in+out)
variable5	Number of collisions (out)
variable6	Number of deferred frames (out)
variable7	Number of queue drops (in)
variable8	Number of queue drops (out)
variable9	Number of discarded frames (in)
variable10	Number of all errors (minus discards) (in)
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Number of unknown protocols (in)
variable17	Number of alignment errors
variable18	Reserved
variable19	Reserved

Table A-5: Column Allocations for MIB2 LAN and MIB2 LAN Full Duplex Elements (Continued)

MTF Variable	Description
variable20	Reserved
variable21	Reserved
variable22	Number of frames (in+out)
variable23	Number of bytes (in+out)
variable24	Number of all errors (minus discards) (in+out)
variable25	Number of discarded frames (in+out)
variable26	Available for OEM use
variable27	Available for OEM use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-6: Column Allocations for Frame Relay Elements

MTF Variable	Description
variable1	Reserved
variable2	Reserved
variable3	Reserved
variable4	Available for OEM use
variable5	Available for OEM use
variable6	Available for OEM use
variable7	Available for OEM use
variable8	Available for OEM use
variable9	Available for use
variable10	Number of all errors
variable11	Available for use
variable12	Number of BECNs (in)

Table A-6: Column Allocations for Frame Relay Elements (Continued)

MTF Variable	Description
variable13	Number of BECNs (out)
variable14	Number of FECNs (in)
variable15	Number of FECNs (out)
variable16	Number of discards
variable17	Number of discard eligible drops
variable18	Number of non-discard eligible drops
variable19	Number of drops
variable20	Number of discard eligible frames (in)
variable21	Number of discard eligible frames (out)
variable22	Number of discard eligible bytes (in)
variable23	Number of discard eligible bytes (out)
variable24	Available for use
variable25	Available for use
variable26	Available for use
variable27	Number of frames (in)
variable28	Number of bytes (in)
variable29	Number of frames (out)
variable30	Number of bytes (out)

Table A-7: Column Allocations for ATM Ports

MTF Variable	Description
variable1	Number of cells (in)
variable2	Number of bytes (in)
variable3	Reserved
variable4	Available for OEM use
variable5	Available for OEM use
variable6	Errored seconds

Table A-7: Column Allocations for ATM Ports (Continued)

MTF Variable	Description
variable7	Severely errored seconds
variable8	Unavailable seconds
variable9	Number of discards (in)
variable10	Number of errors (minus discards) (in)
variable11	Number of AAL5 PDUs received
variable12	Number of AAL5 PDUs transmitted
variable13	Number of AAL5 Received PDUs dropped
variable14	Number of AAL5 Transmitted PDUs dropped
variable15	CLP1 discards total
variable16	CLP1 discards in
variable17	CLP1 cells total
variable18	CLP1 cells in
variable19	Reserved
variable20	Reserved
variable21	Reserved
variable22	Number of cells (in+out)
variable23	Number of bytes (in+out)
variable24	Number of errors (in+out)
variable25	Number of discards (in+out)
variable26	Policy violations total
variable27	Policy violations in
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-8: Column Allocations for ATM Paths

MTF Variable	Description
variable1	Number of AAL5 received PDUs dropped
variable2	Number of AAL5 transmitted PDUs dropped
variable3	Number of AAL5 PDUs received
variable4	Available for OEM use
variable5	Available for OEM use
variable6	Available for OEM use
variable7	Available for OEM use
variable8	Available for OEM use
variable9	Number of AAL5 PDUs transmitted
variable10	Reserved
variable11	Reserved
variable12	Number of discards (in)
variable13	Number of discards (out)
variable14	Number of CLP1 discards total
variable15	Number of CLP1 discards in
variable16	Number of maximum channels (in)
variable17	Number of allocated channels (in)
variable18	Number of CLP1 cells total
variable19	Number of CLP1 cells in
variable20	Number of maximum channels (out)
variable21	Number of allocated channels (out)
variable22	Available for use
variable23	Available for use
variable24	Number of policy violations total
variable25	Number of policy violations in
variable26	Available for use

Table A-8: Column Allocations for ATM Paths (Continued)

MTF Variable	Description	
variable27	Number of cells (in)	
variable28	Number of bytes (in)	
variable29	Number of cells (out)	
variable30	Number of bytes (out)	

Table A-9: Column Allocations for ATM Channels

MTF Variable	Description
variable1	Number of AAL5 received PDUs dropped
variable2	Number of AAL5 transmitted PDUs dropped
variable3	Number of AAL5 PDUs received
variable4	Available for OEM use
variable5	Available for OEM use
variable6	Available for OEM use
variable7	Available for OEM use
variable8	Available for OEM use
variable9	Number of AAL5 PDUs transmitted
variable10	Reserved
variable11	Reserved
variable12	Number of discards (in)
variable13	Number of discards (out)
variable14	Reserved
variable15	Number of CLP1 discards total
variable16	Number of CLP1 discards total (in)
variable17	Number of CLP1 cells total
variable18	Number of CLP1 cells in
variable19	Reserved
variable20	Reserved

Table A-9: Column Allocations for ATM Channels (Continued)

MTF Variable	Description
variable21	Number of policy violations (total)
variable22	Number of policy violations (in)
variable23	Available for use
variable24	Available for use
variable25	Available for use
variable26	Available for use
variable27	Number of cells (in)
variable28	Number of bytes (in)
variable29	Number of cells (out)
variable30	Number of bytes (out)

Table A-10: Column Allocations for Routers

MTF Variable	Description
variable1	Number of frames (in)
variable2	Number of bytes (in)
variable3	Number of non-unicast frames (in)
variable4	Average line utilization
variable5	Average discard rate
variable6	Average packet fault rate
variable7	Number of input queue drops (total)
variable8	Number of output queue drops (total)
variable9	Number of discards (in)
variable10	Number of all errors (minus discards) (in)
variable11	Number of slow packets (in)
variable12	Number of slow packets (out)
variable13	Number of fast packets (in)
variable14	Number of fast packets (out)

Table A-10: Column Allocations for Routers (Continued)

MTF Variable	Description
variable15	Number of bridged packets
variable16	Number of unknown packets
variable17	Number of IP packets
variable18	Number of DECnet packets
variable19	Number of XNS packets
variable20	Number of Appletalk packets
variable21	Number of forward IPX packets
variable22	Number of frames (total)
variable23	Number of bytes (total)
variable24	Number of errors (minus discards) (total)
variable25	Number of frames discarded (total)
variable26	Number of non-unicast frames (total)
variable27	Reserved
variable28	Reserved
variable29	Reserved
variable30	Reserved

Table A-11: Column Allocations for Router CPUs

MTF Variable	Description
variable1	Reserved
variable2	Reserved
variable3	Reserved
variable4	Available for OEM use
variable5	Available for OEM use
variable6	Available for OEM use
variable7	Available for OEM use
variable8	Available for OEM use

Table A-11: Column Allocations for Router CPUs (Continued)

MTF Variable	Description
variable9	Reserved
variable10	Available for use
variable11	Number of bus drops
variable12	CPU count
variable13	Free memory
variable14	Total number of buffers
variable15	Number of buffers used
variable16	Number of small buffer hits
variable17	Number of small buffer misses
variable18	Number of medium buffer hits
variable19	Number of medium buffer misses
variable20	Number of big buffer hits
variable21	Number of big buffer misses
variable22	Number of large buffer hits
variable23	Number of large buffer misses
variable24	Number of huge buffer hits
variable25	Number of huge buffer misses
variable26	Available for use
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Number of buffer create failures

Table A-12: Column Allocations for Servers

MTF Variable	Description
variable1	Number of page ins
variable2	CPU load average
variable3	Number of page outs
variable4	Number of page swap ins
variable5	Number of page swap outs
variable6	Number of file cache hits
variable7	Number of file cache misses
variable8	Total physical memory
variable9	Physical memory used
variable10	Number of page faults
variable11	Average CPU utilization
variable12	CPU imbalance
variable13	Number of interrupts
variable14	Number of active connections
variable15	Number of dropped connections
variable16	Total virtual memory
variable17	Virtual memory used
variable18	Number of small communication buffers dropped
variable19	Total number of large communication buffers
variable20	Number of large communication buffers used
variable21	Number of page scans
variable22	Number of system calls
variable23	Number of processes
variable24	Sum of errors (in+out) and discards
variable25	Sum of discards (in+out)
variable26	Total CPU utilization

Table A-12: Column Allocations for Servers (Continued)

MTF Variable	Description	
variable27	Sum of packets (in)	
variable28	Sum of octets (in)	
variable29	Sum of packets (out)	
variable30	Sum of octets (out)	

Table A-13: Column Allocations for Server CPUs

MTF Variable	Description
variable1	Available for OEM use
variable2	Available for OEM use
variable3	Available for OEM use
variable4	Available for OEM use
variable5	Available for use
variable6	Available for use
variable7	Available for use
variable8	Available for use
variable9	Reserved
variable10	Reserved
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	Reserved

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Table A-13: Column Allocations for Server CPUs (Continued)

MTF Variable	Description
variable21	Reserved
variable22	Reserved
variable23	Reserved
variable24	CPU utilization
variable25	CPU user time
variable26	CPU system time
variable27	CPU wait time
variable28	CPU idle time
variable29	Reserved
variable30	Reserved

Table A-14: Column Allocations for User and System Server Partitions

MTF Variable	Description
variable1	Inode utilization
variable2	Total bytes transmitted and received during the interval, preferably payload bytes
variable3	Available for OEM use
variable4	Available for OEM use
variable5	Available for use
variable6	Available for use
variable7	Available for use
variable8	Available for use
variable9	Reserved
variable10	Reserved
variable11	Reserved
variable12	Reserved
variable13	Reserved

Table A-14: Column Allocations for User and System Server Partitions

MTF Variable	Description
variable14	Reserved
variable15	Reserved
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	Reserved
variable21	Reserved
variable22	Reserved
variable23	Reserved
variable24	Storage capacity
variable25	Storage used
variable26	Reserved
variable27	Partition allocation failures
variable28	Reads
variable29	Writes
variable30	Reads plus writes

Table A-15: Column Allocations for Server Disks

MTF Variable	Description
variable1	Available for OEM use
variable2	Available for OEM use
variable3	Time spent in the busy state
variable4	Queue length
variable5	Available for use
variable6	Available for use
variable7	Reserved

Table A-15: Column Allocations for Server Disks (Continued)

MTF Variable	Description
variable8	Reserved
variable9	Reserved
variable10	Reserved
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	Reserved
variable21	Reserved
variable22	Reserved
variable23	Reserved
variable24	Storage capacity
variable25	Storage used
variable26	Reserved
variable27	Faults
variable28	Reads
variable29	Writes
variable30	Reads plus writes

Table A-16: Column Allocations for Server Interfaces

MTF Variable	Description
variable1	Number of frames (in)
variable2	Number of bytes (in)
variable3	Number of non-unicast frames (in)
variable4	Number of non-unicast frames (in+out)
variable5	Reserved
variable6	Reserved
variable7	Reserved
variable8	Reserved
variable9	Number of errors (in)
variable10	Number of discards (in)
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Number of unknown protocols (in)
variable17	Reserved
variable18	Outgoing queue length
variable19	Reserved
variable20	Reserved
variable21	Reserved
variable22	Number of frames (total)
variable23	Number of bytes (total)
variable24	Number of errors (total)
variable25	Number of discards total
variable26	Reserved

Table A-16: Column Allocations for Server Interfaces (Continued)

MTF Variable	Description
variable27	Reserved
variable28	Reserved
variable29	Reserved
variable30	Reserved

Table A-17: Column Allocations for Server Process Sets

MTF Variable	Description
variable1	Reserved
variable2	Average CPU utilization
variable3	Physical memory used
variable4	Virtual memory used
variable5	Number of pages paged
variable6	Number of pages swapped
variable7	Number of disk blocks read
variable8	Number of disk blocks written
variable9	Number of incoming network messages
variable10	Number of outgoing network messages
variable11	Number of system calls
variable12	Number of threads
variable13	Number of hard page faults
variable14	Number of soft page faults
variable15	Number of swaps
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	Reserved

Table A-17: Column Allocations for Server Process Sets (Continued)

MTF Variable	Description
variable21	Reserved
variable22	Reserved
variable23	Reserved
variable24	Reserved
variable25	Reserved
variable26	Reserved
variable27	Reserved
variable28	Reserved
variable29	Reserved
variable30	Reserved

Table A-18: Column Allocations for RAS Devices

MTF Variable	Description
variable1	Reserved
variable2	Connection time in call seconds
variable3	Number of connect errors
variable4	Average CPU utilization
variable5	CPU imbalance
variable6	Number of non-connect (other) errors
variable7	Number of octets transmitted
variable8	Number of octets received
variable9	Number of discards
variable10	Number of frame errors
variable11	Total memory
variable12	Memory used
variable13	Number of retrains
variable14	Number of frames transmitted
variable15	Number of frames received

Table A-18: Column Allocations for RAS Devices (Continued)

MTF Variable	Description
variable16	Number of connections
variable17	Time spent in the onhook state
variable18	Time spent in the offhook state
variable19	Time spent in the connected state
variable20	Time spent in the disabled state
variable21	Time spent in the unknown state
variable22	Time since the last successful poll
variable23	Modems in use/occupied
variable24	Number of modems/ISDN in the RAS
variable25	Time spent in the busy state
variable26	Time spent in the test state
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-19: Column Allocations for Modem Pools

MTF Variable	Description
variable1	Reserved
variable2	Connection time in call seconds
variable3	Number of connect errors
variable4	Reserved
variable5	Reserved
variable6	Number of non-connect (other) errors
variable7	Number of octets transmitted
variable8	Number of octets received
variable9	Number of discards

Table A-19: Column Allocations for Modem Pools (Continued)

MTF Variable	Description
variable10	Number of frame errors
variable11	Reserved
variable12	Reserved
variable13	Number of retrains
variable14	Number of frames transmitted
variable15	Number of frames received
variable16	Number of connections
variable17	Time spent in the onhook state
variable18	Time spent in the offhook state
variable19	Time spent in the connected state
variable20	Time spent in the disabled state
variable21	Time spent in the unknown state
variable22	Time since the last successful poll
variable23	Modems in use/occupied
variable24	Number of modems/ISDN in the pool
variable25	Time spent in the busy state
variable26	Time spent in the test state
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-20: Column Allocations for Modems

MTF Variable	Description
variable1	Reserved
variable2	Connection time in call seconds
variable3	Number of connect errors

Table A-20: Column Allocations for Modems (Continued)

MTF Variable	Description
variable4	Reserved
variable5	Reserved
variable6	Number of non-connect (other) errors
variable7	Number of octets transmitted
variable8	Number of octets received
variable9	Number of discards
variable10	Number of frame errors
variable11	Call transmit rate
variable12	Call receive rate
variable13	Number of retrains
variable14	Number of frames transmitted
variable15	Number of frames received
variable16	Number of connections
variable17	Time spent in the onhook state
variable18	Time spent in the offhook state
variable19	Time spent in the connected state
variable20	Time spent in the disabled state
variable21	Time spent in the unknown state
variable22	Available for use
variable23	Occupied flag
variable24	Available for use
variable25	Time spent in the busy state
variable26	Time spent in the test state
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-21: Column Allocations for ISDN Interfaces

MTF Variable	Description
variable1	Reserved
variable2	Connection time in call seconds
variable3	Reserved
variable4	Reserved
variable5	Reserved
variable6	Reserved
variable7	Number of octets transmitted
variable8	Number of octets received
variable9	Number of discards
variable10	Number of frame errors
variable11	Call transmit rate
variable12	Call receive rate
variable13	Reserved
variable14	Number of frames transmitted
variable15	Number of frames received
variable16	Number of connections
variable17	Time spent in the onhook state
variable18	Time spent in the offhook state
variable19	Time spent in the connected state
variable20	Time spent in the disabled state
variable21	Time spent in the unknown state
variable22	Reserved
variable23	Connected flag
variable24	Reserved
variable25	Time spent in the busy state
variable26	Time spent in the test state
variable27	Available for use

Table A-21: Column Allocations for ISDN Interfaces (Continued)

MTF Variable	Description	
variable28	Available for use	
variable29	Available for use	
variable30	Available for use	

Table A-22: Column Allocations for Network Paths

MTF Variable	Description
variable1	The minimum response time in milliseconds found over the path during the interval
variable2	The maximum response time in milliseconds found over the path during the interval
variable3	The sum of the squares of total response times
variable4	The number of attempts to detect the round-trip time during the interval
variable5	The number of successful attempts to detect the round-trip time during the interval
variable6	Total bytes transmitted and received during the interval, preferably payload bytes
variable7	Total bytes received during the interval, preferably payload bytes
variable8	Reserved
variable9	Reserved
variable10	Reserved
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Reserved
variable17	Reserved
variable18	Reserved

Table A-22: Column Allocations for Network Paths (Continued)

MTF Variable	Description
variable19	Reserved
variable20	Available for use
variable21	Available for use
variable22	Available for use
variable23	Available for use
variable24	Available for use
variable25	Available for use
variable26	Available for use
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-23: Column Allocations for Network Paths Using DNS

MTF Variable	Description
variable1	The minimum response time in milliseconds found over the path during the interval
variable2	The maximum response time in milliseconds found over the path during the interval
variable3	Reserved
variable4	The number of attempts to detect the round-trip time during the interval
variable5	The number of successful attempts to detect the round-trip time during the interval
variable6	Total bytes transmitted and received during the interval, preferably payload bytes
variable7	Total bytes received during the interval, preferably payload bytes
variable8	Available for use

Table A-23: Column Allocations for Network Paths Using DNS (Continued)

MTF Variable	Description
variable9	Reserved
variable10	Reserved
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	Available for use
variable21	Available for use
variable22	Available for use
variable23	Available for use
variable24	Available for use
variable25	Available for use
variable26	Available for use
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-24: Column Allocations for Network Paths Using HTTP

MTF Variable	Description
variable1	The minimum response time in milliseconds found over the path during the interval
variable2	The maximum response time in milliseconds found over the path during the interval
variable3	Reserved
variable4	The number of attempts to detect the round-trip time during the interval
variable5	The number of successful attempts to detect the round-trip time during the interval
variable6	Total bytes transmitted and received during the interval, preferably payload bytes
variable7	Total bytes received during the interval, preferably payload bytes
variable8	The sum of the response time in milliseconds for the DNS transactions. Used to calculate the average associated DNS response time.
variable9	Reserved
variable10	Reserved
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Available for use
variable20	Available for use
variable21	Available for use

Table A-24: Column Allocations for Network Paths Using HTTP (Continued)

MTF Variable	Description
variable22	Available for use
variable23	Available for use
variable24	Available for use
variable25	Available for use
variable26	Available for use
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-25: Column Allocations for Network Paths for Voice over IP (Jitter)

MTF Variable	Description
variable1	The minimum response time in milliseconds found over the path during the interval
variable2	The maximum response time in milliseconds found over the path during the interval
variable3	Reserved
variable4	The number of attempts to detect the round-trip time during the interval
variable5	The number of successful attempts to detect the round-trip time during the interval
variable6	Total bytes transmitted and received during the interval, preferably payload bytes
variable7	Total bytes received during the interval, preferably payload bytes
variable8	The sum of all jitter measurements from source to destination
variable9	The sum of all negative jitter measurements from source to destination

Table A-25: Column Allocations for Network Paths for Voice over IP (Jitter) (Continued)

MTF Variable	Description
variable10	The sum of all jitter measurements from destination to source
variable11	The sum of all negative jitter measurements from destination to source
variable12	The maximum positive jitter measurement from source to destination during the interval
variable13	The maximum negative jitter measurement (absolute value) from source to destination during the interval
variable14	The maximum positive jitter measurement from destination to source
variable15	The maximum negative jitter measurement (absolute value) from destination to source
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	The total number of jitter measurements from source to destination
variable21	The total number of positive jitter measurements from source to destination
variable22	The total number of negative jitter measurements from source to destination
variable23	The total number of jitter measurements from destination to source
variable24	The total number of positive jitter measurements from destination to source
variable25	The total number of negative jitter measurements from destination to source
variable 26	Available for use
variable 27	Available for use

Table A-25: Column Allocations for Network Paths for Voice over IP (Jitter) (Continued)

MTF Variable	Description
variable 28	Available for use
variable 29	Available for use
variable 30	Available for use

Table A-26: Column Allocations for Application Paths for FirstSense

MTF Variable	Description
variable1	Reserved
variable2	Reserved
variable3	The sum of the squares of total response times
variable4	The number of attempts to detect the round-trip time during the interval
variable5	The number of successful attempts to detect the round-trip time during the interval
variable6	Total bytes transmitted and received during the interval, preferably payload bytes
variable7	Total bytes received during the interval, preferably payload bytes
variable8	The sum of connect response times in milliseconds
variable9	The number of connect attempts
variable10	The number of connect sucesses
variable11	Reserved
variable12	Reserved
variable13	Reserved
variable14	Reserved
variable15	Reserved
variable16	Reserved
variable17	Reserved

Table A-26: Column Allocations for Application Paths for FirstSense (Continued)

MTF Variable	Description
variable18	The total client time
variable19	The total server time
variable20	Available for use
variable21	Available for use
variable22	Available for use
variable23	Available for use
variable24	Available for use
variable25	Available for use
variable26	Available for use
variable27	Available for use
variable28	Available for use
variable29	Available for use
variable30	Available for use

Table A-27: Column Allocations for Network Paths for Empire Service Response

MTF Variable	Description
variable1	The minimum total response time in milliseconds found over the path during the interval
variable2	The maximum total response time in milliseconds found over the path during the interval
variable3	Reserved
variable4	The number of attempts to detect the round-trip time during the interval
variable5	The number of successful attempts to detect the round-trip time during the interval
variable6	Reserved for total bytes transmitted and received during the interval, preferably payload bytes

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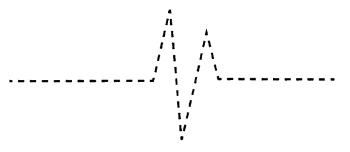
Table A-27: Column Allocations for Network Paths for Empire Service Response (Continued)

MTF Variable	Description
variable7	Reserved for total bytes received during the interval, preferably payload bytes
variable8	The sum of connect response times in milliseconds
variable9	Reserved
variable10	Reserved
variable11	The minimum connect response time in milliseconds
variable12	The maximum connect response time in milliseconds
variable13	The sum of name lookup response times in milliseconds
variable14	The minimum name lookup response time in milliseconds
variable15	The maximum name lookup response time in milliseconds
variable16	Reserved
variable17	Reserved
variable18	Reserved
variable19	Reserved
variable20	The sum of the response times in milliseconds for the Empire Service Response transactions
variable21	The minimum transaction response time in milliseconds
variable22	The maximum transaction response time in milliseconds
variable23	Available for use
variable24	Available for use
variable25	Available for use
variable26	Available for use
variable27	Available for use

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Table A-27: Column Allocations for Network Paths for Empire Service Response (Continued)

MTF Variable	Description
variable28	Available for use
variable29	Available for use
variable30	Available for use



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Attorney's Docket No.: 00124-025001

APPENDIX B

TITLE: LIVEEXCEPTION SYSTEM

APPLICANT: MARK W. SYLOR, GEORGE IGLESIAS, JAY B. WOLF,

WILL C. LAUER AND LAWRENCE A. STABILE

label	element type symbol	label	short label	var id lunits	ts of Jabei	lunits fone fext	Col expression	100
Ethernet	OalignmentErrors	Alignment Errors	Alianment Errors	22	2 Frames	Olype lext	DI ALGN EDBODS	5 0
Ethernet	0 availability	Availability	Availability	181	10 Total Time	11(%)	(AVAILABLE TIME*100.0)	1
Ethernet	0 avgFrameSize	Average Frame Size	Avg Frame Size	700	7 Bytes	4 (bytes)	DELTA TIME*DLL BYTES/DLL FRAMES	310
Ethernet	s[lodped]0	Bad Polls	Rad Polls	120	Doron	787	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
Ethernet	0 bandwidth	Bandwidth Utilization	BW Util	508	4 Percent	1 %	((DLL BYTES*8*100 0)/\$(speed))	8 6
Ethemet	0 bandwidthin	Bandwidth Utilization In	BW Util In	210	4 Percent	1%	((TR_TOKEN*8*100.0)/\$(speed))	87
Ethernet	0 bandwidthOut	Bandwidth Utilization Out	BW Util Out	211	4 Percent	1%	(((DLL_BYTES-TR_TOKEN)*8*100.0)/\$(speed))	269
Emernet	0 bits	Bits	Bits	437	15 Bits	0 //sec	(DLL_BYTES*8.0)	160
Ethernet	Obitsin	Bits In	Bits In	438	15 Bits	0 /sec	(TR_TOKEN*8.0)	161
Ethernet	o procedure	Bits Out	Bits Out	439	15 Bits	0/sec	((DLL_BYTES-TR_TOKEN)*8.0)	268
Ethernet	Objetos	Broadcasts	Broadcasts	6	2 Frames		DLL_BCASTS	
Ethernet	Obviesin	Bytes Rytes In	Bytes Rytes In	7 07	1 5/08	oes/0	DLL_BYTES	
Ethernet	0 bytesOut	Bytes Out	Bytes Out	000	1 Dyles	0/380	IIK IOKEN	23
Ethernet	0 collisions	Collisions	Collisions	3 4	2 Frames	298/0	DEL BYTES-IK TOKEN	265
Ethernet	0 collisionsPct	Collisions %	Collisions %	900	4 Percent	1 %	100 0*DEL TIME*DIL COLLISIONISIDIL EDAMES	15
Ethemet	0 defFramesOut	Deferred Frames (out)	Def Frames Out	626	2 Frames	000/10	TO SIGNAL LOSS	5
Ethernet	0 discardFrames	Discards	Discards	69	2 Frames	Olsec	TR BIT STREAMING	5 4
Ethernet	0 discardsIn	Discards In	Discards In	196		Oser O	TR FRAME COPIED	-10
Ethernet	0 discardsInPct	Discards In %	Discards In %	529	4 Percent	1%	100.0*DELTA TIME*TR FRAME COPIED/DIT FRAMES	1,0
Ethernet	0 discardsOut	Discards Out	Discards Out	197	2 Frames	0 /sec	TR_BIT_STREAMING-TR_FRAME_COPIED	263
100			•				100.0*DELTA_THME*(TR_BIT_STREAMING-	
Ememer	UdiscardsOutPct	Discards Out %	Discards Out %	531	4 Percent	11%	TR_FRAME_COPIED)/DLL_FRAMES	272
Chemet	UdiscardsPct	Uscards %	Discards %	604	4 Percent	7%	100.0*DELTA_TIME*TR_BIT_STREAMING/DLL_FRAMES	27
Fibernet	U errors	Errors	Errors	/ 602	2 Frames	00/860	IDLL ERRORS	-
	National O	Errors III 76	Englant 78	000	4 Fercent	8	100.0-DELIA IIMETIK FREQUENCY/ULL FRAMES	77
Ethernet	0 errorsOutPct	Errors Out %	Errors Out %	532	4 Percent	***************************************	TR FREQUENCY/DLL FRAMES	27
Ethernet	0 errorsPct	Errors %	Errors %	603	4 Percent	1 %	100.0*DELTA_TIME*DLL_ERRORS/DLL_FRAMES	192
Ethernet	0 faultsin	Errors In	Errors In	194	0 Rate	oes/ 0	TR_FREQUENCY	24
thernet	0 faultsOut	Errors Out	Errors Out	195	0 Rate	0 /sec	DLL_ERRORS-TR_FREQUENCY	266
Citiernet	Urrames	rames	Frames	- 50	2 Frames	0 /860	DLL_FRAMES	ľ
Transfer	Official	riames in	riames III	9 8	Z Frames	Ol/sec	IK LOSI FRAME	2
1011101	Oli di li di li di	rigines Out	riames Out	87	Zirrames	O /Sec	JULL FRAMES-IK LOSI FRAME	797
-thernet	0 goodPolls	Good Polls	Good Polls	118	4 Percent		D POLLS+REBOOTS), DELTA TIME	ic.
Ethernet	0 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY	81
- All Company			All Control of	440	C	,	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	'
Chemet	Omissedroils	Missed Polls	Missed Polis	2 .	4 Percent	% L	AD_FOLLS+REBOOTS))*DELIA_(IME	28
Elbernot	Omulticasts	Mulicasts	Multicasts	4 00	2 Frames	0 /860	DLL_MCASIS	2
Young		ACITATION III	NOTION COST III	06-	200	O /sec	IN SEL RECOVERT MODE	
Ethernet	0 nonUnicastOut	Nonunicast Out	Nonunicast Out	199	2 Frames	oes/ 0	DLL_MCASTS+DLL_BCASTS-TR_SET_RECOVERY_MODE	267
Ethernet	Oreachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE TIME*100.0*DELTA TIME/(TOTAL TIME*1.0))	92
							(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	
Ethernet	0 reboots	Reboots	Reboots	121	4 Percent	1 %	OLLS+REBOOTS))*DELTA_TIME	8
Ethernet	0 unicast	Unicast	Unicast	711	2 Frames	0/880	DLL_FRAMES-DLL_BCASTS-DLL_MCASTS	314
Ethernet	0 unknownProtocolPackets	Unknown Protocol Pkts	Unkn Proto Pkts	104	2 Frames	o /sec	TR LINE	9
Oken King	1 abortErrors	TR Abort Errors	TR Abort Errors	8 3	ZiFrames	0 //86	TR_ABORT	2 3
Token Ring	1 address-opiederrors	Availability	Availability	181	10 Total Time	1 (%)	IN ADDRESS COPIED	3 5
Token Ring	1 avoFrameSize	Average Frame Size	Ava Frame Size	92	7 Bytes	4 (hytes)	DELTA TIME DI RYTES/DI FRAMES	3
D							(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
Token Ring	1 badPolls	Bad Polls	Bad Polls	120	4 Percent	1%	POLLS+REBOOTS))*DELTA_TIME	29
roken Ring	1 bandwidth	Bandwidth Utilization	BW Util	500	4 Percent	1%	((DLL_BYTES*8*100.0)/\$(speed))	6
Token Ring	1 bits	Bits	Bits	437	15 Bits	0//860	(DLL_BYTES'8.0)	160
oxen King	1 proadcasts	Broadcasts	broadcasts	5	zirrames	nl/sec	DEL BCASIS	٦

label	element tune evenhet	lohol	otol total	13	14 11-1-1			
n Ring	-	TR Burst Errors	TR Burst Errors	G D	2 Frames	umis_type text	Col expression	100
Token Ring	1 bytes	Į i	Bytes	2	1 Bytes	0//86	DLL BYTES	7
Token Ring	1 congestionErrors	TR Congestion Errors	TR Cong Errors	10	2 Frames	0/sec	TR_CONGESTION	21
Token Ring	1 errors		Errors	4	2 Frames	0/sec	DLL_ERRORS	100
Token Ring	1 frameCopiedErrors	TR Frame Copied Errors	TR Frame Copied	11	2 Frames	0//sec	TR_FRAME_COPIED	25
Token Ring	1 frames		Frames	1	2 Frames	0 //sec	DLL_FRAMES	-
l oken king	1 frequencyErrors	TR Frequency Errors	TR Freq Errors	12	2 Frames	0 /sec	TR_FREQUENCY	24
Token Ring	1 goodPolls	Good Polts	Good Polis	118	4 Percent	7	((100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	Ľ.
Token Ring	1 hord Errore		1	7	L		TR_SET_RECOVERY_MODE+TR_SIGNAL_LOSS+TR_BIT_	5
Token Ring	1 Internal Errors	TR Internal From	TR Internal Error	13	2 Frames	Olysec 0	STREAMING+TR_CONTENTION_STREAMING	51
Token Ring	1 latency	Latency	Latency	208	11 Milliseconds	1/meac)	I ATENCY	18
Token Ring	1 lineErrors	TR Line Errors	TR Line Errors	14	2 Frames) lear	TO TIME	0 4
Token Ring	1 llcFrames	TR LLC Frames	TR LLC Frames	15	2 Frames	0 /sec	TR 11C FRAMES	200
Token Ring	1 lostFrameErrors	TR Lost Frame Errors	TR Lost Frm Err	16	2 Frames	000/0	TR 1 OST EDAME	3 6
Token Ring	1 missedPolls	Missed Polls	Missed Polls	419	4 Percent	8 7	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	77 0
Token Ring	1 multicasts	Multicasts	Multicasts	4	2 Frames	0//sec	DLL_MCASTS	9 8
Token Ring	1 reachability	Reachability	Reachability	182	10 Total Time	1(%)	(REACHABLE TIME-190,0*DELTA TIME//TOTAL TIME*1 0))	76
Token Ring	1 reboots	Reboots	Reboots	121	4 Percent	- 	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P) OLLS+REBOOTS))*DELTA_TIME	09
Token Ring	1 softErrors	TR Soft Errors	TR Soft Errors	62	2 Frames	0/860	TR_LINE+TR_BURST+TR_INTERNAL+TR_ABORT+TR_ADD RESS_COPIED+TR_CONGESTION+TR_LOST_FRAME+TR_ TOKEN+TR_FREQUENCY+TR_FRAME_COPIED	6
Token Ring	1 tokenErrors	TR Token Errors	TR Token Errors	17	2 Frames	0/860	TR TOKEN	23
Token Ring	1 unicast	Unicast	Unicast	711	2 Frames	0 /sec	DLL_FRAMES-DLL_BCASTS-DLL_MCASTS	314
MIB2LAN		Alignment Errors	Alignment Errors	S	2 Frames	0 /sec	TR_BURST	17
MIBZLAN	2 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	11
MIBZLAIN	2 avgrrameSize	Average Frame Size	Avg Frame Size	200	7 Bytes	4 (bytes)	DELTA_TIME*TR_TOKEN/TR_LOST_FRAME	311
INTERCAIN	Zavgrramesizein	Average Frame Size in	Avg Frame Sz In	101	7 Bytes	4 (bytes)	DELTA_TIME*DLL_BYTES/DLL_FRAMES	310
MIB2LAN	2 avgFrameSizeOut	Average Frame Size Out	Avg Frame Sz Out	702	7 Bytes	4 (bytes)	DELTA_TIME*(TR_TOKEN-DLL_BYTES)/(TR_LOST_FRAME- DLL_FRAMES)	306
MIB2LAN	2 badPolls	Bad Polls	Bad Polls	120	4 Percent	%	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS)**DELTA_TIME	59
MIB2LAN	2 bandwidth	Bandwidth Utilization	BW Ufil	209	4 Percent	11%	((TR_TOKEN*8*100.0)/\$(speed))	87
MIB2LAN	2 bandwidthIn		BW Util In	210	4 Percent	1 %	((DLL_BYTES*8*100.0)/\$(speed))	92
MIBSLAN	2 Ibarowich Out	Bandwidth Utilization Out	Buts Oil Out	117	4 Percent	% 1	(((IK_IOKEN-DLL_BYTES)*8*100.0)/\$(speedOut))	80
MIB2LAN	2 bitsin	Bits In	Bits In	438	15 Bits	0/860	(DLL BYTES'8.0)	160
MIB2LAN	2 bitsOut	Bits Out	Bits Out	439	15 Bits	0////	((TR_TOKEN-DLL_BYTES)*8.0)	166
MIB2LAN	2 bytes	Bytes	Bytes	2	1 Bytes	0//860	TR_TOKEN	23
MIBZLAN	2 bytesin	Bytes in	Bytes in	18	1 Bytes	oes/ 0	DLL_BYTES	7
MIBZLAN	2 bytesOut	Bytes Out	Collisions Out	627	1 Bytes	0/200	(IR_IOREN-DLL_BYTES)	\$ u
14123144		(200) 2000000000	3				100.0*DELTA_TIME*DLL_RCV_OFF_FRAMES/(TR_LOST_F	
MISSLAN	2 collisionsOutPct	Comstons (out) %	Oof Eramos Out	626	2 Frames	2007/0	KAME-ULL_TKAMES)	37/
MIROLAN		Discorded Framos	Discarded Frames	57	2 Frames	01/260	TR FRAMES	25.0
MIB2LAN	2 discardsin	Discards In	Discards In	196		oes/lo	DIL COLLISIONS	6
Mib2LAN		Discards In %	Discards in %	529	4 Percent	7%	100.0*DELTA_TIME*DIL_COLLISIONS/DLL_FRAMES	191
MIB2LAN	2 discardsOut	Discards Out	Discards Out	197	2 Frames	0 /sec	(TR_FRAME_COPIED-DILL_COLLISIONS)	83
MIBZIAN	2) discardsOutPct	Discards Out %	Discards Out %	531	4 Percent	- %	100.0*DELTA_TIME*(TR_FRAME_COPIED-	193
MIB2LAN	2 errors	Errors	Errors	1	2 Frames	0/sec	TR FREQUENCY	24
MIBZLAN	2 errorsin	Errors In	Errors In	213	2 Frames	0)/sec	DLL_ERRORS	10
MIBZLAN	2 errorsInPct	Errors in %	Errors In %	530	4 Percent	11%	100.0*DELTA_TIME*DLL_ERRORS/DLL_FRAMES	192
MiB2LAN	2 errorsOut	Errors Out	Errors Out	212	2 Frames	0l/sec	TR_FREQUENCY-DLL_ERRORS	64

12501	alament tune lenenhal	laha!	and trong	22.74	var id lunits id label	units type text	COL PADITESCION
iana	elettett type symbol	Tabel	200	2	2000	200	100.0*DELTA_TIME*(TR_FREQUENCY-
MIBZLAN	2 errorsOutPct	Errors Out %	Errors Out %	532	4 Percent	1 %	DLL_ERRORS)/(TR_LOST_FRAME-DLL_FRAMES)
MIB2LAN	2 errorsPct	Errors %	Errors %	603	4 Percent	1%	100.0*DELTA_TIME*TR_FREQUENCY/TR_LOST_FRAME
MIBZLAN	2 frames	Frames	Frames	-	2 Frames	oes/ 0	TR_LOST_FRAME
MIB2LAN	2 framesin	Frames In	Frames In	28	2 Frames	o /sec	DL1_FRAMES
MIB2LAN	2 framesOut	Frames Out	Frames Out	29	2 Frames	0 /sec	(TR_LOST_FRAME-DLL_FRAMES)
14 IV				- 5	7	- 6	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA
MIROLAN	2 goodFolls	Social Polis	GOOD FOILS	208	11 Milisoconds	1 /mean)	ATENCY
	z laterity	raterioy	Latericy	202	epilopeeiiiiai 11	/naeiii)	1/100 0*MISSED POLLS//GOOD POLLS+MISSED POLLS+B
MIB2LAN	2 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME
MIB2LAN	2 nonUnicast	Nonunicast	Nonunicast	99	2 Frames	oes/ 0	DLL_BCASTS
MIB2LAN	2 nonUnicastin	Nonunicast In	Nonunicast In	198	2 Frames	oes/ 0	DLL_MCASTS
MIB2LAN	2 nonUnicastOut	Nonunicast Out	Nonunicast Out	199	2 Frames	0 /360	(DLL_BCASTS-DLL_MCASTS)
MIB2I AN	2 reachability	Reachability	Reachahility	182	10 Total Time	1 (%)	(REACHABLE TIME 100 0°DELTA TIME/(TOTAL TIME*1 0))
	Amononia -	Amora Donor				707	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P
MIB2LAN	2 reboots	Reboots	Reboots	121	4 Percent	1 %	OLLS+REBOOTS))*DELTA_TIME
MIB2LAN	2 unicast	Unicast	Unicast	711	2 Frames	o /sec	TR_LOST_FRAME-DLL_BCASTS
MIB2LAN	2 unicastin	Unicast In	Unicast In	712	2 Frames	0 /sec	DLL_FRAMES-DLL_MCASTS
WIDOL AND	- 0		t coin	743	Comcan	000/0	(TR_LOST_FRAME-DLL_FRAMES)-(DLL_BCASTS-
MIDZLAN	ZunicasiOut	T	Unicast Cut	200	2 Frances	0 /260	DEL_WCASIS)
MIBZLAN Sunta I de Bookertene	2 unknownProtocolPackets	Unknown Protocol	Onkn Proto Pkts	104	2 Frames	0 /sec	I K LINE
Switch Lite Backplane	2 availability	Average Frame Size	Ava Frame Size	002	7 Rytes	4 (hytes)	INELTA TIME*TR TOKEN/TR LOST FRAME
Switch I to Backplane	2 hookalanol Witzelion		Rackniana I Itil	240	4 Percent	1 %	I/TR TOKEN*8*100 0/%/speedTotal)
			0 20 0 00	120	A Borront		(100.0°BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_POY 1 S+BEBOOTS),*PEI TA TIME
Switch Lite backprane	Spadroils	Dad Polls	Framer	120	2 Frames	0/ 1/0	TO LOST FRAME
Switch cite Dackplane	S il dicies	- Idilias	2000	0 7	A Doctor	20 4	(100.0°GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA
Switch Life Backplane	3 goodFolls	GOOD POILS	Sood Tors	000	4 relicin	100000/ 1	A TEMPO
SWICH LIFE DACKDIANE	Siatency	Latericy	raiging	3	200000000000000000000000000000000000000	(append)	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B
Switch Lite Backplane	3 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME
Switch Lite Backelane	2 resorbability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))
Switch Life Backplane	3 total Butes	Total Rytes	Tit Bytes	124	1 Bytes	01/sec	TR TOKEN
MIDSI AN	AlanmentErrore	Alignment Frons	Alianment Frrors	100	2 Frames	0/sec	TR BURST
MIDSLAN	4 availability	Availability	Availability	181	10 Total Time	11(%)	(AVAILABLE TIME*100.0)
MIBSI AN	4 avoFrameSize	Average Frame Size	Avg Frame Size	2002	7 Bytes	4 (bytes)	DELTA_TIME*TR_TOKEN/TR_LOST_FRAME
MIBSI AN	4lavoFrameSizeIn	Average Frame Size In	Avg Frame Sz In	701	7 Bytes	4 (bytes)	DELTA_TIME*DLL_BYTES/DLL_FRAMES
WIESELPIN	A sweEsmeSizeOut	Average Frame Size Out	Avg Frame Sz Out	702	7 Bytes	4 (bytes)	DELTA_TIME:(TR_TOKEN.DLL_BYTES)/(TR_LOST_FRAME- DLL_FRAMES)
		il		120	4 Boront	*	(100.0'BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ BOILS+BEROOTS), TREET A TIME
MIBZLAN	4 badPolls		Dad rolls	2000	A Dorona	4 6%	1/17 TOKEN*8*100 0\\$(speedTotal)
MIB2LAN	4 bandwidth	Bandwidth Utilization	DVV UIII	240	4) Percent	1 %	((O) 1 BYTES*8*100.0\/\$(speedln))
MIBZLAN	4 bandwidthin	Dandwidth Utilization Out	PAC INI ON	244	4 Percent	1 %	I(ITR TOKEN-DIL BYTES)*8*100.0)/\$(speedOut))
MIBZLAN	4 bandwigthOut		Bite	437	15 Bits	oes/ 0	(TR TOKEN'8.0)
MIBZLAN		Bits in	Bits In	438	15 Bits	0 /sec	(DLL BYTES*8 0)
MIBZLAN	ti Cotal A	Bits Out	Bits Out	439	15 Bits	0//860	((TR_TOKEN-DLL_BYTES)*8.0)
MIRSIAN	Albytes	Bytes	Bytes	2	1 Bytes	0 /8ec	TR_TOKEN
MIRSTAN	Albytesin	Bytes In	Bytes In	18	1 Bytes	0 //sec	DLL_BYTES
MIB2LAN	4 bytesOut	Bytes Out	Bytes Out	20	1 Bytes	oes/ 0	(TR_TOKEN-DLL_BYTES)
MIB2LAN	4 collisionsOut	Collisions (out)	Collisions Out	627	2 Frames	0 /sec	DLL_RCV_OFF_FRAMES
200	A collector CutPct	Collisions fout) %	Collisions Out %	720	4/Percent		100.0*DELTA_TIME*DLL_RCV_OFF_FRAMES/(*R_LOS*)_F RAME*DLL_FRAMES)
MIBZLAN	4 defFramesOut	Deferred Frames (out)	Def Frames Out	929	2 Frames	0 /sec	DLL_XMT_OFF_FRAMES
		Discorded Espense	Discorded Eromos	6.7	OfFrames	Olser	

			1000		244			
crement sype	4 discardeln	Disports In	Discords In	Var IG	units in tabel	units type text	col expression	00
	4 discardsInPct	Discards In %	Discards In %	2002	A Doroont	Ol/Sec	ULL COLLISIONS	
	4 discardsOut	Discards Out	Discards Out	197	2 Frames	1 70	TOU.DELLA TIME DIL COLLISIONS/DIL FRAMES	191
						2007	100.0*DELTA_TIME*(TR_FRAME_COPIED-	3
	4 discardsOutPct	Discards Out %	Discards Out %	531	4 Percent	%	DLL_COLLISIONS)/(TR_LOST_FRAME-DLL_FRAMES)	193
	4 errorein	Errors In	Errors fr	, 5,0	ZIFrames	0 /sec	TR_FREQUENCY	24
	4 orrorshippet	Criticis III	Crrors in	213	Z rrames	0/sec	DLL_ERRORS	9
	4 errorsOut	Errors Out	Errors Out	2430	2 Frames	1%	TE EPECITEMENT FINE TIME TO THE TENTES	192
					2	296/0	100.0*DELTA_TIME*(TR_FREQUENCY.	9
	4 errorsOutPct	Errors Out %	Errors Out %	532	4 Percent	1 %	DLL_ERRORS)/(TR_LOST_FRAME.DLL_FRAMES)	<u>6</u>
	4 errorsPct	Errors %	Errors %	603	4 Percent	1%	100.0*DELTA_TIME*TR_FREQUENCY/TR_LOST_FRAME	219
	4 II dilles	rames	Frames	- 3	2 Frames	oes/0	TR_LOST_FRAME	22
	4 frameon at	riames in	Frames In	87	2 Frames	oes/0	DLL_FRAMES	
	+ ilalites Out	rrames out	rrames out	67	2 Frames	oes/0	(TR_LOST_FRAME-DIL_FRAMES)	82
	4 goodPolls	Good Polls	Good Polls	118	4 Percent	-	(100.016000_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	ű
	4 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY	27
	4 missedPolls	Missed Polis	Missed Polls	119	4 Percent	7 %	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	1 4
	4 nonUnicast	Nonunicast	Nonunicast	26	2 Frames	0/890	DI BCASTS	8
	4 nonUnicastfn	Nonunicast In	Nonunicast In	198	2 Frames	0/86/	DI MOASTS	
	4 nonUnicastOut	Nonunicast Out	Nonunicast Out	199		oes/0	(DLL_BCASTS-DLL_MCASTS)	84
	4 reachability	Reachability	Reachability	182	10 Total Time	1(%)	(REACHABLE TIME:100 0:DELTA TIME//TOTAL TIME:10)	26
	4 reboots	Robode	Pahoote	5	10000		+MISSED_POLL	
	4 unicast	Unicast	Unicast	711	2 Frames	0/ 10	TE LOST EDAME DI BOASTS	2 2
	4 unicastin	Unicast In	Unicast In	712	2 Frames	0/sec	DLL FRAMES-DLL MCASTS	315
	4 unicastOut	Unicast Out	Unicast Out	713	2 Frames	0/398	(TR_LOST_FRAME-DLI_FRAMES)-(DLL_BCASTS-D) MCASTS)	300
,	4 unknownProtocolPackets	Unknown Protocol Pkts	Unkn Proto Pkts	104	2 Frames	0/sec	TR_LINE	16
10	100 availability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE TIME*100.0)	77
10(100 avgFrameSize	Average Frame Size	Avg Frame Size	700	7 Bytes	4 (bytes)	DELTA_TIME*TR_TOKEN/TR_LOST_FRAME	311
100	100 avgFrameSizeIn	Average Frame Size In	Avg Frame Sz In	704	7 Bytes	4 (bytes)	DELTA_TIME*DLL_BYTES/DLL_FRAMES	310
100	100 avgFrameSizeOut	Average Frame Size Out	Avg Frame Sz Out	702	7 Bytes	4 (bytes)	DELTA_TIME'(TR_TOKEN-DLL_BYTES)/(TR_LOST_FRAME. DLL_FRAMES)	38
	100 hodbotte	ollog bog	Bod Dolla	430	9	1	(100.0°BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	8
100	100 bandwidth	Bandwidth I Mization	BW (In)	200	4 Percent	1 %	VOLUSTREBOULS)/ VELIA_ LIME	202
100	100 bandwidthIn	Bandwidth Utrization In	BW Util In	210	4 Percent	1%	((DLL_BYTES*8*100.0)/\$(speedin))	78
100	100 bandwidthOut	Bandwidth Utilization Out	BW Util Out	211	4 Percent	1%	(((TR_TOKEN-DLL_BYTES)*8*100.0)/\$(speedOut))	80
100	100 bits	Bits	Bits	437	15 Bits	0//sec	(TR_TOKEN*8.0)	161
100	100 bitsin	Bits In	Bits In	438	15 Bits	0/890	(DLL_BYTES*8.0)	160
100	100 bitsOut	Bits Out	Bits Out	439	15 Bits	0/sec	((TR_TOKEN-DLL_BYTES)*8.0)	166
100	100 bytes	Bytes In	Bytes In	7 0	1 Bytes	0//0	I'K IOKEN	2
100	100 bytesOut	Bytes Out	Bytes Out	202	1 Bytes	200/0	(TR TOKEN, DIT BYTES)	74
100	100 discardedFrames	Discarded Frames	Discarded Frames	57	2 Frames	0/880	TR FRAME COPIED	25
100	100 discardsin	Discards in	Discards In	196	2 Frames	oes/0	DLL_COLLISIONS	6
90	100 discardsInPct	Discards In %	Discards In %	529	4 Percent	1 %	100.0*DELTA_TIME*DLL_COLLISIONS/DLL_FRAMES	191
100	discardsOut	Discards Out	Discards Out	197	2 Frames	oes/0	(TR_FRAME_COPIED-DLL_COLLISIONS)	83
100	100 discardsOutPot	Discards Out %	Discards Out %	534	Albarrant	- 70	100.0*DELTA_TIME*(TR_FRAME_COPIED.	102
100		Errors	Errors	-	2 Frames	0/49/0	TR FREDIENCY	24
100		Errors In	Errors In	213	2 Frames	0/sec	DLL ERRORS	10
100	oct	Errors In %	Errors In %	530	4 Percent	1 %	100.0 DELTA_TIME DLL_ERRORS/DLL_FRAMES	192
-		Frore Out	Frore Out	212	2 Eramos	000/10		

WAN	100 errorsOutPct 100 errorsPct 100 frames 100 framesin 100 framesCut	Errors Out % Errors %	Errors Out %	532				
WAN Frame Relay Frame Relay Frame Relay Frame Relay Frame Relay Frame Relay	100 ferrors of 100 frames Out	Errors Cat %	9	7		7017	ומבר בעעמעמין וע רספין די איישוק-טרך די איישוקט	404
WAN	100 frames 100 framesin 100 framesOut		Frors %	603	4 Percent	7 %	/I =	210
WAN	100 framesin 100 framesOut	Frames	Frames	7	2 Frames	0/590	TR I OST FRAME	22
WANN WANN WANN WANN WANN WANN WANN WANN	100 framesOut	Frames In	Frames In	28	2 Frames	08/10	DIL FRAMES	
WAN	200	Frames Out	Frames Out	29	2 Frames	0/sec	(TR_LOST_FRAME-DLL_FRAMES)	82
WAN		2000	S POS	4	P. Constant	3	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	
WAN	100 latency	Latency	Latency	208	11 Miliseconds	1 (msec)	LATENCY	81
WAN WAN WAN WAN WAN WAN WAN WAN WAN Frame Relay	400 moreodDalls	A posting	Africa Colle	140	A Dorman	8	((100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	ů
WAN	400 most bisset	Moster Poils	Montangoot	55	2 Eromon	0/ - 0	MU_POLESTREBOOLS)) DELIA_IIME	00 1
WAN WAN WAN WAN WAN WAN WAN WAN Frame Relay	100 nonlinicastin	Noninicast In	Nonunicast In	198	2 Frames	pas/in	DIL BOASTS	4 6
WAN WAN WAN WAN WAN WAN WAN Frame Relay	100 nonUnicastOut	Nonunicast Out	Nonunicast Out	199	2 Frames	0/sec	(DLL_BCASTS-DLL_MCASTS)	84
WAN WAN WAN WAN Frame Relay Frame Relay Frame Relay Frame Relay Frame Relay	100 reachability	Reachability	Reachability	182	10 Total Time	1(%)	(REACHABLE TIME 100 0:DELTA TIME (TOTAL TIME 1 0))	76
WAN WAN WAN Frame Relay	100 reports	Dobodo	Bohode	25	A Borroad	600	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	9
WAN WAN WAN Frame Relay	100 linicast	Incast	Unicast	711		0/290	TR LOST FRAME-DIT BCASTS	316
WAN WAN Frame Relay	100 unicastin	Unicast In	Unicast In	712	2 Frames	0 /sec	DLL_FRAMES-DLL_MCASTS	315
WAN Frame Relay	Character	tuO tagadi	tagord]	743	2 Frames	Cool	OST_FRAME	300
Frame Relay Frame Relay Frame Relay Frame Relay Frame Relay Frame Relay	100 umcastout	Ť	Unkn Proto Pkis	104		098/0	TR LINE	19
Frame Relay Frame Relay Frame Relay Frame Relay Frame Relay	101 availability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE_TIME*100.0)	11
Frame Relay Frame Relay Frame Relay Frame Relay				00,			DELTA_TIME*(BYTES_IN+BYTES_OUT)/(PACKETS_IN+PAC	Š
Frame Relay Frame Relay Frame Relay	101 avg-ramesize	Average Frame Size	Avg Frame Size	207	7 Bytes	4/(bytes)	NEIS_OUI) DEITA TIME*DII RYTES/DII FRAMES	310
Frame Relay Frame Relay Frame Relay	In tay of tall the stell in	Avelage rigine olde iii	70 BIIB 1 BAV		Section	t (p) (cs)	DELTA_TIME*(TR_TOKEN-DLL_BYTES)/(TR_LOST_FRAME-	
Frame Relay Frame Relay	101 avgFrameSizeOut	Average Frame Size Out	Avg Frame Sz Out	702	7 Bytes	4 (bytes)	DLL_FRAMES)	306
Frame Relay	101 badPolls	Bad Polls	Bad Polls	120	4 Percent	%	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_) POLLS+REBOOTS)*DELTA TIME	59
(500)	101 bandwidth	Bandwidth Utilization	BW Util	509	4 Percent	11%	(((BYTES_IN+BYTES_OUT)*8*100.0)/\$(speedTotal))	91
Frame Relay	101 bandwidthin	Bandwidth Utilization In	Bw Util In	210	4 Percent	1%	((BYTES_IN*8*100.0)/\$(speedin))	8
Frame Relay	101 bandwidthOut	Bandwidth Utilization Out	BW Util Out	211	4 Percent	% 1	((BYTES_OUT'8'100.0)/\$(speedOut))	3 8
Frame Relay	101 becnin	BECN In	BECN IN	25	Z Frames	0 / 28¢	100 0*DELTA TIME*TR SET RECOVERY MODE/PACKETS	7
Frame Belay	101 becnInPct	BECN In %	BECN In %	630	4 Percent	- %	NI.	277
Frame Relay	101 becnOut	BECN Out	BECN Out	31	2 Frames	0 //sec	TR_SIGNAL_LOSS	13
Frame Relay	101 becnOutPct	BECN Out %	BECN Out %	631	4 Percent	1 %	100.0*DELTA_TIME*TR_SIGNAL_LOSS/PACKETS_OUT	278
Frame Relay	101 bits	Bits	Bits	437	15 Bits	0 /sec	((BYTES_IN+BYTES_OUT)*8.0)	162
Frame Relay	101 bitsin	Bits in	Bits In	438	15 Bits	oes/0	(BYTES_IN*8.0)	167
Frame Kelay	TotalbitsOut	Bits Out	Bris Out	629	13 Dits	Olysec Olysec	BYTES INTEXTES OUT	B.
Frame Relay	101 bytes 101 bytesin	Bytes Bytes In	Bytes In	18	1 Bytes	olysec 0/sec	BYTES IN	388
Frame Relay	101 bytesOut	Bytes Out	Bytes Out	20	1 Bytes	0/sec	BYTES_OUT	30
Frame Relay	101 connectionInPct	#FECN + BECN In %	FECN/BECN In %	533	4 Percent		100 0*DELTA_TIME*(TR_SET_RECOVERY_MODE+TR_BIT_ STREAMING)/PACKETS_IN	195
	104	2 4 10 NO 20 4 1 NO 20 1	% tro NOBBON OBB	234	4 Percent	26	100 0*DELTA_TIME*(TR_SIGNAL_LOSS+TR_CONTENTION STREAMING)/PACKETS OLIT	196
Frame Relay	101 congestionOutred	5	DE Bydee In	40	2 Frames	O/sec		22
Frame Delay	101 deByteshi	DE Bytes Out	DE Bytes Out	41		0 //sec	TR TOKEN	23
Frame Relay	101 deDrops	DE Drops	DE Drops	32	2 Frames	0 /sec	TR BURST	17
Frame Relay	101 deFramesIn	DE Frames In	DE Frames In	38	2 Frames	0 /sec	TR_ADDRESS_COPIED	20
Frame Relay	101 deFramesInPct	DE Frames In %	DE Frames in %	721	4 Percent	1%	100.0*DELTA_TIME*TR_ADDRESS_COPIED/PACKETS_IN	328
Frame Relay	101 deFramesOut	DE Frames Out	DE Frames Out	39	2 Frames	0/sec	TR_CONGESTION	21
Frame Relay	101 deFramesOutPct	DE Frames Out %	DE Frames Out %	722	4 Percent	1%	100.0*DELTA_TIME*TR_CONGESTION/PACKETS_OUT	329
Frame Relay	101 discards	Discards	Discards	177	Z Frames	0/260	100 0-DELINE	1
Frame Relay	101 discards Pct	Discards %	Discards %	604	4 Percent		T)	221

8 8 9 9 5

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100

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label	element type	symbol	label	short_label	var_id uni	units_id label	units_type text	col_expression	oo id
Visual Frame Relay	103	bytesin	Bytes In	Bytes In	18	1 Bytes	0 //sec	BYTES_IN	88
Visual Frame Relay	103	103 bytesOut	Bytes Out	Bytes Out	20	1 Bytes	0 /sec	BYTES_OUT	30
			9 1 40 1	O TO	533	4 Boroont	7	100.0*DELTA_TIME*(TR_SET_RECOVERY_MODE+TR_BIT_	195
Visual Frame Kelay	103	103 congestioninPct	FECN + BECN EI %		3	1000	8/	100.0*DELTA TIME*(TR SIGNAL LOSS+TR CONTENTION	2
Visual Frame Relay	103	103 congestionOutPct	FECN + BECN Out %	FECN/BECN Out %	534	4 Percent	%	_STREAMING)/PACKETS_OUT	196
Visual Frame Relay	103	103 deBytesIn	DE Bytes In	DE Bytes In	40	2 Frames	0 /sec	TR_LOST_FRAME	22
Visual Frame Relay	103	deBytesOut	DE Bytes Out	DE Bytes Out	41		0 /sec	TR_TOKEN	23
Visual Frame Relay	103	103 deFramesin	DE Frames In	DE Frames In	88		0/sec	TR_ADDRESS_COPIED	20
Visual Frame Retay	103	103 deFramesOut	DE Frames Out	DE Frames Out	33	2 Frames	0/sec	TR_CONGESTION	21
Visual Frame Relay	103	103 errors	Errors	Errors	7	2 Frames	0/sec	DLL_ERRORS	2
Visual Frame Relay	103	103 feculn	FECN In	FECN in	32		0//sec	TR_BIT_STREAMING	14
Visual Frame Relay	103	103 fecnOut	FECN Out	FECN Out	83		0 /sec	IR_CONTENTION_STREAMING	15
Visual Frame Relay	103	103 frameDeltveryRatio	Frame Delivery Ratio	Frame Del Ratio	529	4 Percent	1%	(100.0*DLL_BCASTS)	203
Visual Frame Relay	103	frames	Frames	Frames	- 8		0 /sec	(PACKETS_IN+PACKETS_COT)	0, 6
Visual Frame Relay	103	103 framesin	Frames In	Frames In	87	Zirames	0 /560	PACKEIS IN	300
Visual Frame Relay	103	103 framesOut	Frames Out	rrames Out	R7		DAS/O	1400 0:000 BOLLSHISSEN BOLLSHISSEN BALLSHBA	67
Vietral Frame Relay	103	103 good Dolls	Good Polls	Good Polls	118	4 Percent	7	D POLLS+REBOOTS))*DELTA TIME	22
Visual Frame Relay	103	103 latency	Round Trip Delay	Round Trip Delay	560	4 Percent	1%	LATENCY	81
Marial Especial	60,	004 000 000 000 000	Mond Dolle	Meson Dolle	110	4 Percent	%	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	28
Visual Flaine Ivelay	201	SIO DOSSIII	200 1 0000		-				
Visual Frame Relay	103	103 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	76
				1	ç	- Constant	70/	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	9
Visual Frame Relay	103	103 reboots	Keboots	Percols Duret Advisor 1	554	4 Percent	8 %	/100 0*DI RCV OFF FRAMES)	204
Visual Frame Relay	103	103 Visualburst i		Buret Advisor 2	555	4 Percent	18%	(100.0*DLL XMT OFF FRAMES)	205
Visual Frame Relay	103	103 visualBurst3	Birst Advisor Level 3	Burst Advisor 3	556		11%	(100.0*DLL_TRANSITS)	206
Visual Frame Relay	103	visitalBurst4			557	4 Percent	11%	(100.0*DLL_ENET_FRAMES)	207
Visual Frame Relay	103	103 visualBurst5		Burst Advisor 5	558		1 %	(100.0*DLL_COLLISIONS)	208
ATM Port	105	105 aal5Pdus	AAL5 PDUs	AAL5 PDUs	432	8 Cells	0 /sec	DIL_ALGN_ERRORS+TR_SET_RECOVERY_MODE	156
ATM Port	105	aal5PdusDiscarded	Discarded AAL5 PDUs	AALSPDUs Dsc	433	8 Cells	0/sec	TR_SIGNAL_LOSS+TR_BIT_STREAMING	157
ATM Port	105	105 aal5PdusDiscardedIn	Discarded AAL5 PDUs In	AAL 5PDUs Dsc In	311	8 Cells	oes/lo	TR SIGNAL LOSS	7
1 0 7 1	i c	to Calbobracai Canbo Store	% of all IS DOI 15 to %	AAI SPDU Dsc fn %	615	4 Percent	***	S	226
ATM Port	105	105 aai5PdusDiscardedOut	Discarded AAL5 PDUs Out	AALSPDUs Dsc Out	312		oes/0	TR_BIT_STREAMING	14
								100.0*DELTA_TIME*TR_BIT_STREAMING/TR_SET_RECOV	200
ATM Port	105	105 aal5PdusDiscardedOutPct	Discarded AAL5 PDUs Out %	AAL5PDU Dsc Out%	616	4 Fercent	9,	400 05DE TA TIME*/TB SIGNAL LOSS+TB BIT STREAM	1
	100	40E parterodum Disparado d Dot	Discorded AAI & DOI Is %	AAI SPOUDS %	614	4 Percent	7	NG)/(DLL ALGN ERRORS+TR_SET_RECOVERY_MODE)	225
ATM Port	105	aat5Pdusin		AAL5 PDUs In	309	8 Cells	oes/ 0	DLL_ALGN_ERRORS	Ξ
ATM Port	105	105 aal5PdusOut	AAL5 PDUs Out	AAL5 PDUs Out	310		0 /sec	TR_SET_RECOVERY_MODE	122
ATM Port	105	105 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	1
			:	0	,	100000	70	(100.0°BAD_POLLS/(GUOD_POLLS+MISSED_FOLLS+BAD_ DOLLS+BEBOOTS)*DELTA_TIME	29
ATM Port	105	105 badPolls	Bad Polls	Bad Foils	2000	4 Felcent	1 %	(/TR_TOKEN*8*100.0)/\$(speedTotal))	79
ATM Port	105	bandwidth	Bandwidth Utilization	DAY CIII	240	A Dercent	20%	((D) 1 BYTES*8*100 (0)(\$(speedln))	78
ATM Port	105	105 bandwidthin	Bandwidth Uttilization In	BW Ulli Dut	211	4 Percent	2 %	(((TR_TOKEN-DL_BYTES)*8*100.0)/\$(speedOut))	80
ATM Port	105	105 bandwidthOut	Barrawidiri Quitzanori Out	Bits	437	15 Bits	0//980	(TR TOKEN*8.0)	161
ATM FOR	105	bitelp	Bits In	Bits In	438	15 Bits	0/860	(DLL_BYTES*8.0)	160
ATM Port	105	105 bitsOut	Bits Out	Bits Out	439	15 Bits	0 //sec	((TR_TOKEN-DLL_BYTES)*8.0)	166
ATM Port	105	bytes	Bytes	Bytes	2	1 Bytes	0/sec	TR TOKEN	23
ATM Port	105	bytesin	Bytes In	Bytes In	18	1 Bytes	o /sec	DLL_BYTES	77
ATM Port	105	105 bytesOut	Bytes Out	Bytes Out	20	1 Bytes	oes/0	(TR_TOKEN-DLL_BYTES)	4 6
ATM Port	105	105 cells	Cells	Cells	184	0 Rate	oes/0	TR LOST FRAME	77
ATM Port	105	cellsin	Cells In	Cells In	200	0 Rate	0/200	INTERIOR EDAME DI EDAMES	82
ATM Port	105	105 cellsOut	Cells Out	Cells Out	704	U Kate	Olyaco	TO LOST COME TO SHOOT	134
ATM Port	105	105 cip0Cells	CLP0 Cells	ICLPU Cells	4701	ologija	22212	[1] [Con. Com. 1] Con. C	

						7 7		100
label	element type symbol	label	Short_label	Var_Id units	units_id_label	units_type text		135
Alw ror	ins chocensiii	OLTO Ceila III		1771	2000	2000	(TR LOST FRAME-DIL FRAMESI-(TR BURST-	
ATM Part	105 clp0CellsOut	CLP0 Cells Out	CLP0 Cells Out	425	8 Cells	0 /sec	TR_INTERNAL)	136
ATM Port	105 clp0Discards	CLP0 Discards	CLP0 Discards	420	8 Cells	0 /sec	TR_FRAME_COPIED-TR_CONTENTION_STREAMING	131
ATM Port	105 ctp0DiscardsIn	CLP0 Discards In	CLP0 Discards In	421	8 Cells	ol/sec	DLL_COLLISIONS-TR_LINE	132
ATM Port	405 to Contract of the Contrac	C to Discords to %	% ul spost De l'O	621	4 Percent	%	100.0*DELTA_TIME*(DLL_COLLISIONS-TR_LINE;//DLL_FRAMES-TR_INTERNAL)	232
ATM Port	100 diponiscalusiii or		O Discarde Oil	422	8 Cells	765/0	(TR_FRAME_COPIED-TR_CONTENTION_STREAMING)-	133
	100 colonia co						100.0*DELTA_TIME"((TR_FRAME_COPIED. TR_CONTENTION_STREAMING)-(DLL_COLLISIONS-	
ATM Port	105 clo0DiscardsOutPct	CLP0 Discards Out %	CLP0 Dscds Out %	622	4 Percent	1 %	TR_LINE))/(TR_LOST_FRAME-TR_BURST)-(DLL_FRAMES- TR_INTERNAL))	233
		1					100.0*DELTA_TIME*(TR_FRAME_COPIED- TR_CONTENTION_STREAMING)/(TR_LOST_FRAME-	
ATM Port	105 clp0DiscardsPct	CLP0 Discards %	CLP0 Dscds %	620		1%	TR_BURST)	231
ATM Port	105 clp1Cells	CLP1 Cells	CLP1 Cells	411	8 Cells	0//860	TR_BURST	17
ATM Port	105 clp1CellsIn	CLP1 Cells In	CLP1 Cells In	412	8 Cells	0/8ec	TR_INTERNAL	9
ATM Port	105 clp1CellsInPct	CLP1 Cells In %	CLP1 Cells In %	717	4 Percent	1%	100.0*TR_INTERNAL/DLL_FRAMES	313
ATM Port	105 clp1CellsOut	CLP1 Cells Out	CLP1 Cells Out	413	8 Cells	0/sec	TR BURST-TR INTERNAL	871
FOO MEA	205 201 201 201 201 201	% tilo sleo ta io	CI P1 Calls Out %	718	4 Percent	- 1	TOUGHT REAMES	320
ATM Port	105 ch 10sts bet	CI P1 Calls %	CLP1 Cells %	716	4 Percent	1%	100 0'TR BURST/TR LOST FRAME	318
ATM Port	105 ch 10scards	CLP1 Discards	CLP1 Disc	409	8 Celts	oes/ 0	TR_CONTENTION_STREAMING	15
ATM Port	105 ctp1DiscardsIn	CLP1 Discards In	CLP1 Disc In	408	8 Cells	0 /sec	TR_LINE	16
ATM Port	105 clp1DiscardsInPct	CLP1 Discards In %	CLP1 Dscds In %	618	4 Percent	1%	100.0*DELTA_TIME*TR_LINE/TR_INTERNAL	229
ATM Port	105 clp1DiscardsOut	CLP1 Discards Out	CLP1 Disc Out	410	8 Cells	0 /sec	TR_CONTENTION_STREAMING-TR_LINE	127
HA Door	4 Oft of Shanna of Anio 30 h	CI D1 Discards Out %	Ct P1 Decds Out %	619	4 Percent	%	100.0*DELTA_TIME*(TR_CONTENTION_STREAMING- TR_LINE;/(TR_BURST-TR_INTERNAL)	230
Atia roll	יייי שניייי שניייי שנייייי שנייייי שניייייי שניייייייי		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	5		70	100 0*DELTA_TIME*TR_CONTENTION_STREAMING/TR_BU	228
ATM Port	105 clp1DiscardsPct	CLP1 Discards %	CLP1 Uscds %	100	4 Percent	0/20	TR FRAME COPIED	25
AIM Port	Torona documents	Discards in	Discards in	491	S Cells	0//890	DIT COLLISIONS	6
AIM FOR	100 discardain	Discarde In %	Discards in %	529	4 Percent	11%	100.0 DELTA TIME DLL COLLISIONS/DLL FRAMES	191
ATM POR	405 discorde Out	Discards Out	Discards Out	492	8 Cells	0/sec	(TR FRAME COPIED-DLL COLLISIONS)	83
ATM FOR	inconsistent con	o to O springer	% tri Cabracia	531	/ Parcent	3	100.0*DELTA_TIME*(TR_FRAME_COPIED-	193
ATM Port	105 discardsOutPct	Discards Out %	Clacalus Out %	200	1000	2		
ATM Port	105 discardsPct	Discards %	Discards %	604	4 Percent	1%	100.0*DELTA_TIME*TR_FRAME_COPIED/TR_LOST_FRAME	262
ATM Port	105 erroredSeconds	Errored Seconds	Errored Seconds	299	4 Percent	1%	DLL_XMT_OFF_FRAMES*100.0	153
ATM Port	105 errors	Errors	Errors	450		0/380	IN TRECOGNOT	5
ATM Port	105 errorsin	Errors In	Errors In	530	4 Percent	1 %	100.0*DELTA TIME*DLL_ERRORS/DLL_FRAMES	192
AIM FOR	405 peroxeOut	From Out	Frors Out	494	8 Cells	0/sec	TR_FREQUENCY-DLL_ERRORS	94
ATM Bott	105 arrorsOutPot	From Out %	Errors Out %	532	4 Percent	7 %	100.0*DELTA_TIME*(TR_FREQUENCY- DILL_ERRORS)/(TR_LOST_FRAME-DLL_FRAMES)	194
	A TOO OTTO OTTO	also O proc	Good Polls	118	4 Percent		(100 0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA D POLLS+REBOOTS))*DELTA_TIME	22
ATM Port	103 goodFolls	l atency	Latency			1 (msec)	LATENCY	81
Alm Por	105 missed Dalls	Missed Polls	Missed Polis		4 Percent	, r	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME	58
A M YOU	105 Thisself Oils	Policy Violations	Policy Vitns	417	8 Cells	0 /sec	TR_LLC_FRAMES	92
ATM POR	105inolioviolationsin	Policy Violations In	Policy Vitns In	418	8 Cells	0 /sec	PACKETS_IN	27
ATM Dort	105 pollcy/jolationsInPct	Policy Violations In %	Plcy Vitns in %	624	4 Percent	1%	100.0*DELTA_TIME*PACKETS_IN/DLL_FRAMES	235
ATM Port	105 policyViolationsOut	Policy Violations Out	Policy VItns Out	419	8 Cells	0 /sec	TR_LLC_FRAMES-PACKETS_IN	250
1	POP Contraction No.	Potrov Violations Out %	Picv Vitra Out %	625	4 Percent	1 %	100 0'DELTA_TIME'(IR_LLC_FRAMES- PACKETS_IN)/(TR_LOST_FRAME-DLL_FRAMES)	236
ATM Port	105 policy violations Ct	Policy Violations %	Plcy Vitns %	623	4 Percent	1%	100.0*DELTA_TIME*TR_LLC_FRAMES/TR_LOST_FRAME	234
15.11	The state of the s							

1-4-1		Inhal	short label	var to limits to label	of units type text	text	ol expression	col id
iana	etenten type symbol	I I I I I I I I I I I I I I I I I I I						
ATM Port	105 reachability	Reachability	Reachability	182 10 Tot	10 Total Time	1(%)	(REACHABLE_TIME*100.0*DELTA_TIME*(TOTAL_TIME*1.0))	1,6
1-0	200	100	Doboote	121 4 Der	Derzent	8	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P)	09
AIM Port	105 repoots	Keboots	Rebooks	1		0,0	OLLO TRANSTE 4000	155
ATM Port	105 sevErroredSeconds	Severely Errored Seconds	Sev Err Seconds	300 4 Fer	Percent	20	DIL ENET ERAMES*+OOO	154
AIM Por	105 Unavailable Seconds	Onavailable Seconds	AAI E DOI IS	σ	=	7690	DI MCASTS+DI COLISIONS	237
ATM Faul	100 dalor dus	21003	AALEDOI LOGO			200/0	DI FRAMES-DI BYTES	249
ATM Pain	106 aalor dusciscarded	Discarded AAI 5 DD11s In	AAI SPOTE Dec In	9		O /sec	DI FRAMES	-
ATM Dath	406 pale desplaced design	Discorded AALS DOLLS IN 92	AAI SPOI i Dec In %	>	to	1 %	100 O'DELTA TIME DI LE PAMES DI MOASTS	251
ATM Path	106 aatsDdusDiscardedOut	Discarded AALS POUR Out	AAI SPOLIS DSC Out		=	0 /sec	DI BYTES	2
ATM Dath	100 adior disconded of	7	AAI SPOIT Dec Out%	,	-	1 %	100 0*DELTA TIME*DI RYTES/DI COLLISIONS	252
LIBL MIX	Too ago Language and and an	Discarded AALS F	WALST DO Dat Out /a		1100	8	400 0*DELTA TIME*(C) ERAMES+DI BYTES/(C) MC	
ATM Poth	408 as Special Control of the Special Control	Discorded AAI 5 POLIS	AAI SPOITOSC %	614 4 Per	Percent	- %	100.0 DELIA_TIME (DEL_TRAMESTDEL_BTIES)/(DEL_TMC) ASTS+DLL COLLISIONS)	250
ATM Dath	106 aalsDdueln	AAI 5 POI 16 In	AAI S POI is in	000		O /sec	DI I MCASTS	6
ATM Dath	100 dator doi:	AAI 5 DOI 16 Out	AAI 5 POI 1s Out	0		0 /sec	SNOISITIO	6
ATA4 Oath	106 all profed Channele	Allocated Channels	Allocated Chals			4	(TR BURST+TR CONGESTION)	96
ATM Path	106 allocatedChanneistn	Allocated Channels In	Alloc Chan in	19		4	TR BURST	11
ATM Path	106 allocatedChanne(sOut		Alloc Chan Out			4	TR CONGESTION	21
ATM Path	106 availability		Availability	181 10 Tot	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	77
	(modulated Add		:				(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	ŭ
ATM Path	106 badPolls	Bad Polls	Bad Polls		Percent	%	PULLS+REDUCIS/) CELIA IIME	3 2
ATM Path	106 bandwidth	Bandwidth Utilization	BW Util	4	cent	88	((BYTES_IN+BYTES_OUT)-8-TUU.0/(\$(Speed total))	5
ATM Path	106 bandwidthIn	Bandwidth Utilization In	BW Util In	270 4 170	rercent	8 8	((BTTES_IN 0 100:0)) a(speculity)	8 8
ATM Path	106 bandwidthOut	Bandwidth Utilization Out	Bw Util Out		ent	%	((BYTES_COT & 100.0)/a(speadCut))	180
ATM Path	106 bits	Bits	Bits	43/ 15 Bits		n /sec	(BYTES IN+8YTES OUT) 8.0)	784
ATM Path	106 bitsIn	Bits In	Bits In			oes/ n	BY IES IN 8.0)	107
ATM Path	106 bitsOut	Bits Out	Bits Out	2		n /sec	(BYIES_OUT-8.0)	è
ATM Path	106 bytes	Bytes	Bytes) /sec	BYTES IN +BYTES OUT	3 8
ATM Path	106 bytesin	Bytes In	Bytes In				BY IES IN	9 6
ATM Path	106 bytesOut	Bytes Out	Bytes Out	20 1 Bytes		0 /sec	BYTES OUT	300
ATM Path	106 cells	Cells	Cells) /sec	ACKEIS IN+PACKEIS OUT	3 5
ATM Path	106 cellsin	Cells In	Cells In	0		0/sec	PACKEIS IN	7 6
ATM Path	106 cellsOut	Cells Out	Cells Out	٥		0 /860	PACKETS_OUT	2 5
ATM Path	106 clp0Cells	CLP0 Cells	CLP0 Cells	80		0 /sec	PACKEIS IN+PACKEIS OUI)-IR INIERNAL	3
ATM Path	106 clp0CellsIn	CLP0 Cells In	CLP0 Cells In	424 8 Cells	S) /sec	PACKETS (N.TR. ABORT)	4 5
ATM Path	106 clp0CellsOut	CLP0 Cells Out	CLP0 Cells Out	425 8 Cells	S	J/sec	ACKEIS OUT-(IR INTERNAL-IR ABORT)	7
4.0	4 Oct of Control	O Discards	Ci Po Discards	420 8 Cells	<u>s</u>) /sec	(TR_SET_RECOVERY_MODE+TR_SIGNAL_LOSS)- TR_BIT_STREAMING	144
AIM Fain	log cipoDiscalus	OLT O DISCOLUS					TR_SET_RECOVERY_MODE-	
ATM Path	106 clp0DiscardsIn	CLP0 Discards In	CLP0 Discards In	421 8 Cells		0 /sec	TR_CONTENTION_STREAMING	143
							100.0*DELTA_TIME*(TR_SET_RECOVERY_MODE- TR_CONTENTION_STREAMING)/(PACKETS_IN-	
ATM Path	106 clo0DiscardsInPct	CLP0 Discards In %	CLP0 Dscds In %	621 4 Per	Percent	1 %	TR_ABORT)	257
		0	00 10	422 B Cells		Jes/ U	TR_SIGNAL_LOSS-(TR_BIT_STREAMING- TR_CONTENTION_STREAMING)	145
ATM Path	106 cipUDiscardsOut	CLPU Discards Out	CLTO Discalus Ou				100.0°DELTA_TIME*(TR_SIGNAL_LOSS-	
							(TR_BIT_STREAMING- TR_CONTENTION_STREAMING))/(PACKETS_OUT-	
ATA DATA	106 clanDiscardsOutPct	CLP0 Discards Out %	CLP0 Dscds Out %	622 4 Per	Percent	% 1	(TR_INTERNAL-TR_ABORT))	258
III III III III III III III III III II							100.0*DELTA_TIME*((TR_SET_RECOVERY_MODE+TR_SIG	
							NAL_LUSS)- TR_BIT_STREAMING)/((PACKETS_IN+PACKETS_OUT)-	
ATA Data	106 clo0DiscardsPct	CLP0 Discards %	CLP0 Dscds %	620 4 Per	Percent	%	TR_INTERNAL)	256
ATM Path	106 clp1Cells	CLP1 Cells	CLP1 Cells		S) /sec	TR_INTERNAL	2 3
ATM Path	106 clp1CellsIn	CLP1 Cells In	CLP1 Cells In	412 8 Cells		0 /sec	TR ABORT	200
ATM Path	106 clp1CellsInPct	CLP1 Cells In %	CLP1 Cells In %	4	ant	%	100.0*TR_ABORT/PACKETS_IN	138
ATM Path	106 clp1CellsOut	CLP1 Cells Out	CLP1 Cells Out	413 8 Cells		0 /sec	TR INTERNALITE ABORT	325
ATM Path	106 clp1CellsOutPct	CLP1 Cells Out %	CLP1 Cells Out %	718 4 Percen	cent	%	100.0°(TR_INTERNAL-TR_ABORT)/PACKETS_OUT	040

				ŀ				
ATM Path	element type symbol	label	Ci P1 Cells %	716 units	4 Percent	umis_type_text	100 0*TR INTERNAL (PACKETS IN+PACKETS OUT)	324
ATM Path	106 clot Discards	CLP1 Discards	CLP1 Disc	409	8 Cells	0 //sec	TR BIT STREAMING	14
ATM Path	106 clo1DiscardsIn	CLP1 Discards In	CLP1 Disc In	408	8 Cells	oes/0	TR CONTENTION STREAMING	15
ATM Path	106 cto1DiscardsInPct	CLP1 Discards In %	CLP1 Dscds In %	618	4 Percent	1 %	100.0*DELTA TIME*TR LINE/TR INTERNAL	229
ATM Path	106 ctp1DiscardsOut	CLP1 Discards Out	CLP1 Disc Out	410	8 Cells	0/sec	TR BIT STREAMING-TR CONTENTION STREAMING	137
ATM Path	4 Ost Cohrange Chala	O Discoords Out %	CI P4 Decde Out %	640	A Porcent	3	100.0*DELTA_TIME*(TR_CONTENTION_STREAMING- TR ! IME//TR RIBST_TR !NTERNA!)	220
Tally ratio	100 cip i Discards Outre:	OLY I Discards Out 76	CLT 1 USUAS COL 70	610	4 LAICEUI	0/	100 0.05 TA TIME-TE CONTENTION STREAMING/TE BL	\perp
ATM Path	106 clp1DiscardsPct	CLP1 Discards %	CLP1 Dscds %	617	4-Percent	7	RST	
ATM Path	106 discardedCells	Discarded Cells	Discarded Cells	186	0 Rate	0 /sec	(TR SET RECOVERY MODE+TR SIGNAL LOSS)	94
ATM Path	106 discardedCellsIn	Discarded Cells In	Disc Cells In	201	0 Rate	0 /sec	TR_SET_RECOVERY_MODE	L
ATM Path	106 discardedCellsOut	Discarded Cells Out	Disc Cells Out	205	0 Rate	0 /sec	TR_SIGNAL_LOSS	L
ATM Path	4.0 Coloradorile	/0 -1 - changes	O ed change	000		100	100.0*DELTA_TIME*TR_SET_RECOVERY_MODE/PACKETS	L
ATM Path	106 discarde During	Discards Rt 76	Discards III 70	524	4) Percent	90 /0	A00 OFFICE TATALETE CONTACT TO CONTACT TO THE PERSON OF TH	181
	5 5000	Clarence Cut /6	Discards Out /0		# Leicell	Q.	100.0 DELIA TIME IN SIGNAL EGOS/PACKETS OUT	000
ATM Path	106 discardsPct	Discards %	Discards %	604	4 Percent	*	NAL_LOSS)/((PACKETS_IN+PACKETS_OUT))	245
ATM Path	106 200 200 200 200 200 200 200 200 200 2	allog poor	alod book	118	A Dorcont	8	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	5.7
ATM Dath	406 lobook	GOOD LOIS	Silo L Dio	0 00	44 14.115	1 //0	P_roccatagood by urtily lime	à à
ATM Dath	100 latency	Latency	Latency	208	1 I Milliseconds	(msec)	CALENCY	8 6
ATM Dath	406 maximumortals	Meximum Channels	Maximum Channels	107	0 Rate	Des/ O	(IN_LINE+IN_ADDRESS_COPIED)	CS 4
ATM Path	106 maximumChannelSin	Maximum Channels In	Max Channels in	202	O Rate	0//08	TO ADDRESS CORED	200
	TOO STATE OF THE S	Maximum Oranimas Oct	Wax Charmes Out	2002	ONGIG		(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	7
ATM Path	106 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1%	AD_POLLS+REBOOTS))*DELTA_TIME	58
ATM Path	106 policyViolations	Policy Violations	Policy Vitns	417	8 Cetts	0 /sec	TR_FREQUENCY	24
ATM Path	106 policyViolationsIn		Policy VItns In	418	8 Cells	0 /sec	TR_FRAME_COPIED	25
ATM Path	106 policyViolationsInPct	Policy Violations In %	Picy Vitns In %	624	4 Percent	1%	100.0*DELTA_TIME*TR_FRAME_COPIED/PACKETS_IN	260
ATM Path	106 policy Violations Out	Policy Violations Out	Policy Vitns Out	419	8 Cells	o /sec	TR_FREQUENCY-TR_FRAME_COPIED	61
ATM Path	106 policyViolationsOutPct	Policy Violations Out %	Plcy Vitns Out %	625	4 Percent	- %	100.0*DELTA_TIME*(TR_FREQUENCY- TR_FRAME_COPIED)/PACKETS_OUT	261
ATM Path	106 policyViotationsPct	Policy Violations %	Plcy Vitns %	623	4 Percent	%	100.0*DELTA_TIME*TR_FREQUENCY/(PACKETS_IN+PACK ETS_OUT)	259
ATM Path	106 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE TIME*100.0*DELTA_TIME(TOTAL_TIME*1.0))	92
17 - 17 - 17 - 17 - 17 - 17 - 17 - 17 -			400	5,5	4 Boronst	2	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+BEDOTS))*DELTA TIME	9
A I M Path	106 reboots	Keboots	A A L & DOUB	420	4 7 910 911	1000	DILLOTAREDOUGH COLLECTIVE	237
ATM Channel	107 aalsPdus	Pars PDUS	AALS PDUS	432	A Cells	298/0	DII FRAMES+DII BYTES	238
ATM Channel	407 aalsDdusDiscardedin	Discorded AAI 5 DOI to In	AAI 5PDUS DSc In	311	8 Cells	0/sec	DLL FRAMES	
ATM Channel	107 aal5PdusDiscardedInPct	Discarded AAL5 PDUs In %	AALSPDU Dsc In %	615	4 Percent	1%	100.0 DELTA_TIME DLL_FRAMES/DLL_MCASTS	240
ATM Channel	107 aal5PdusDiscardedOut		AAL5PDUs Dsc Out	312	8 Cells	o /sec	DLL_BYTES	2 2
ATM Channel	107 aal5PdusDiscardedOutPct	Discarded AAL5 PDUs Out %	AALSPDU Dsc Out%	616	4 Percent	1%	100.0*DELTA_TIME*DLL_BYTES/DLL_COLLISIONS	241
		% of COO & VAN be proposed to	A A 1 5 P D 1 1 Der %	614	4 Percent	***************************************	TUU.U.DELIA_IIME (DLL_FRAMES+DLL_BTICS)/(DLL_MO ASTS+DLL_COLLISIONS)	239
ATIN CIBILITIES	107 agis Daniela	A 61 5 POLI Is In	AA! 5 PDI Is In	309	8 Cells	0//860	DLL MCASTS	3
ATM Channel	107 aals Danie	AAI 5 PDUs Out	AAL 5 PDUS Out	310	8 Cells	oes/0	DLL_COLLISIONS	6
ATM Channel	107 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100 0)	77
			1	120	A Boroont	%	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLIS+BEROOTS)*DELTA_TIME	59
ATM Channel	107 badPolls	Bad Polls	Day File	2000	A Dercent	2 %	((//BYTES IN+RYTES OITT*8*100.0)/\$(speedTotal))	91
ATM Channel	107 bandwidth	Bandwidth Unitzation in	BW Util In	210	4 Percent	1 %	((BYTES_IN*8*100.0)/\$(speedin))	90
ATM Channel	107 handwidthOut	Bandwidth Utilization Out	BW Util Out	211	4 Percent	1%	((BYTES_OUT*8*100.0)/\$(speedOut))	88
ATM Channel	107 hits	Bits	Bits	437	15 Bits	oes/ 0	((BYTES_IN+BYTES_OUT)*8.0)	162
ATM Channel	107 IbitsIn	Bits In	Bits In	438	15 Bits	0 /sec	(BYTES_IN*8.0)	164
ATM Channel	107 bitsOut	Bits Out	Bits Out	439	15 Bits	oes/0	(BYTES OUT*8.0)	167
ATM Channel	107 bytes	Bytes	Bytes	2	1 Bytes	0 //sec	BYTES_IN+BYTES_OUT	8 6
ATM Channel	107 bytesin	Bytes In	Bytes In	18	1 Bytes	0 //sec	BYTES IN	3 6
ATM Channel	107 bytesOut	Bytes Out	Bytes Out	70	TiBytes	oes/lo	BTIES_CO.	

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label	element type symbol	symbol	label	short label	var id units		units type text	Col expression
Router	200	availability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE_TIME*100.0)
Router	200	200 avgLineUtilization	Av Line Utilization	Av Line Util	99		1%	DLL_BCASTS
Router	200	avgPacketDiscardRate	Av Packet Discard Rate	Av Pkt Dscrd Rte	67	4 Percent	7 %	DLL_RCV_OFF_FRAMES
Router	200	200 avgPacketFault	Av Packet Error Rate	Av Pkt Error	68	4 Percent	1%	DLL_XMT_OFF_FRAMES
	000	- -		olog bog	120	4 Percent		(100.0°BAD_POLLS(GOOD_POLLS+MISSED_POLLS+BAD_ POLIS+REBOOTS)*DELTA_TIME
Kouter	007	ZOU bagroils	Dad Folls	Discords In	196	2) Frames	0 /360	DIT COLLISIONS
Router	007	200 discardsin	Discards Out	Discards Out	197	2 Frames	0/sec	(TR FRAME COPIED-DLL COLLISIONS)
1000	002	organia de la compania del compania del compania de la compania del la compania de la compania della compania d	Total Errore	T# Errors	125	2 Frames	01/860	TR FREQUENCY
Router	200	200 errorsh	From In	From to	213	2 Frames	oes/0	DLL ERRORS
Router	2002	200 errorsInPot	Errors In %	Frrors In %	530		1%	100.0*DELTA TIME*DLL ERRORS/DLL FRAMES
Political	2002	orional or	From Out	Frons Out	212	2 Frames	0//sec	TR FREQUENCY-DLL ERRORS
	007	aloion.	100000000000000000000000000000000000000					100.0*DELTA_TIME*(TR_FREQUENCY-
Router	200	200 errorsOutPct	Errors Out %	Errors Out %	532	4 Percent	1%	DLL_ERRORS)/(TR_LOST_FRAME-DLL_FRAMES)
Router	200	200 forwardedAtalkPackets	Forwarded Appletalk Pkts	Frwrd Apple Pkts	75	2 Frames	oes/ 0	TR_ADDRESS_COPIED
Router	200	200 forwardedDecnetPackets	Forwarded Decnet Pkts	Frwrd Decnt Pkts	73	2 Frames	0 /sec	TR_INTERNAL
Router	200	200 forwardedIpPackets	Forwarded IP Pkts	Frwrd IP Pkts	72	2 Frames	0 /8ec	TR_BURST
Router	200	200 forwardedlpxPackets	Forwarded IPX Pkts	Frwrd IPX Pkts	16	2 Frames	oes/ 0	TR_CONGESTION
Router	200	200 forwardedXnsPackets	Forwarded XNS Pkts	Frwrd XNS Pkts	74	2 Frames	0 /sec	TR_ABORT
Router	200	200 frames	Total Frames	Ttl Frames	123	2 Frames	0 /sec	TR_LOST_FRAME
								((100.0*GOOD_POLLS(GOOD_POLLS+MISSED_POLLS+BA
Router	200	200 goodPolls	Good Polls	Good Polls	118	4 Percent	1%	U_PULLS+REBUCIS)/**DELIA_TIME
Router	200	200 latency		Latency	208	11 Milliseconds	1 (msec)	TAD CONTENTION STDEAMING
Router	200	200 learningBridgedPackets	Learning Bridged Pkts	Lrng Brdgd PKts		z rrames	o /sec	WASSEN DOLLSWINGSED BOLLS+MISSED BOLLS+B
; ·	000	OCC Designation	Massad Dolls	Missed Polls	119	4 Percent	*	AD_POLLS+REBOOTS))*DELTA_TIME
Router	200	misseurons nonlimpset	Noningest	Nonunicast	26	2 Frames	0 /8ec	TR_LLC_FRAMES
Douge	002	200 nonlineastin	Noninicast In	Nonunicast In	198	2 Frames	oes/ 0	DLL_MCASTS
Router	200	200 nonUnicastOut	Nonunicast Out	Nonunicast Out	199	2 Frames	os/ 0	(TR_LLC_FRAMES-DLL_MCASTS)
								(TR_LOST_FRAME-DLL_FRAMES)-TR_BURST-
Router	200	200 otherControiPackets	Other&Control Pkts	Other&Cntrl Pkts	117	2 Frames	0 /200	TR_CONGESTION-1R_CONTENTION_STREAMING
			400	Doorhability	182	10 Total Time	1 (%)	(REACHABLE TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0)
Router	200	200 reachability	Keachability	Readilability	70	2		(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P
1	1000	200 rehoots	Rehonts	Reboots	121	4 Percent	1 %	OLLS+REBOOTS))*DELTA_TIME
Courer	2002	200 totatRutes	Total Bytes	Til Bytes	124	1 Bytes	0 /890	TR_TOKEN
Douter	2002	200 totalFramesDiscarded	Total Frames Discarded	Til Frms Discard	126	2 Frames	0 /sec	TR_FRAME_COPIED
Router	200	200 totalincomingBytes	Total Incoming Bytes	Total In Bytes	78	1 Bytes	o //sec	DLL_BYTES
Britter	200	200 total incoming Packets	Total Incoming Pkts	Total In Pkts	77	2 Frames	0 /sec	DILL_FRAMES
Bouter	200	200 total Outgoing Bytes	Total Outgoing Bytes	Tit Out Bytes	80	1 Bytes	0/sec	(TR TOKEN-DLL BYIES)
Router	200	200 totalOutgoingPackets	Total Outgoing Pkts	Til Out Pkts	79	2 Frames	o / sec	(TR_LOSI_FRAME-DLL_FRAMES)
Router	200	200 unknownProtocolPackets	Unknown Protocol Pkts	Unkn Proto Pkts	104	2 Frames	0 //860	VALUE THACKSON
Router	201	availability	Availability	Availability	181	10 Total Time	(%)	(AVAILABLE 1903)
Router	201	201 avgLineUtilization	Av Line Utilization	Av Line Util	99 5	4 Percent	0, 70	DIL DOV OFF FRAMES
Router	201	201 avgPacketDiscardRate	Av Packet Discard Rate	Av Pkt Dscrd Kte) a	4 Percent	70,7	DIL XMT DEF FRAMES
Router	201	avgPacketFault	Av Packet Error Rate	Av Pkt Error	80	4	0	(100.0*BAD POLLS/(GOOD POLLS+MISSED_POLLS+BAD_
	-	į	7 T	Rad Polls	120	4 Percent		POLLS+REBOOTS) DELTA TIME
Router	207	ZUI Dadroils	Budged Pkts	Bridged Pkts	87	2 Frames	o /sec	TR_CONTENTION_STREAMING
Kouter	201	priugeurachers	Discards In	Discards In	196	2 Frames	oes/ 0	DILL_COLLISIONS
Router	204	201 discardeOut	Discards Out	Discards Out	197	2 Frames	0 /sec	(TR_FRAME_COPIED-DLL_COLLISIONS)
Nouise	204	arone entrois	Total Errors	Ttl Errors	125	2 Frames	oes/ 0	TR_FREQUENCY
Douter	201	201 errorsin	Errors In	Errors In	213	2 Frames	oes/ 0	DLL_ERRORS
Bouler	201	201 errorsInPct	Errors In %	Errors In %	530	4 Percent	%	100.0*DELIA TIME*DLL EKKUKS/ULL TKAWES
Router	201	errorsOut	Errors Out	Errors Out	212	2 Frames	Ol/Sec	100 0-DELTA TIME-/TR ERECIENCY.
		ļ	% ti C	mmors Out %	532	4 Percent	7	DLL_ERRORS)/(TR_LOST_FRAME-DLL_FRAMES)
Router	201	201 errorsOutPct	Fast Pkts In	Fast Pkts In	85	2 Frames	oes/ 0	TR_SIGNAL_LOSS
	107	201 rastr-acketsin	I dot i nto III		20	2 Eramoe	0/860	TO BIT STDEAMING

lahai	leferment fune	symbol	label	short label	var id units	id label	units type text		3
Router	20	1 forwardedAtalkPackets	Forwarded Appletalk Pkts	Frwrd Apple Pkts	75		oes/ O	COPIED	20
Router	202	201 forwardedDecnetPackets		Frwrd Decnt Pkts	73	2 Frames	oes/O	TR_INTERNAL	18
Router	20	201 forwardedlipPackets		Frwrd IP Pkts	72	2 Frames	oes/ O	TR_BURST	17
Router	20	201 forwardedlpxPackets	Forwarded IPX Pkts	Frwrd IPX Pkts	9/	2 Frames	oes/ O	TR_CONGESTION	21
Router	20	201 forwardedXnsPackets	Forwarded XNS Pkts	Frwrd XNS Pkts	74	2 Frames	0 /sec	TR_ABORT	19
Router	20)1 frames	Total Frames	Ttt Frames	123	2 Frames	O/sec	TR_LOST_FRAME	22
		-11-07	ollog bear	100 por 0	ά,	Dorona	*	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	52
Router	200	201 good Polis	1 atency	Latency	208		1 (msec)	LATENCY	8
					9,		7	(100.0°MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	5
Router	20	201 missedPolls	Missed Polls	Missed Polis	119	4 Percent	% -	AD_POLLS*REBOOTS)}*DELIA_TIME	200
Router	20	201 nonUnicast	Nonunicast	Nonunicast	96		0 /sec	IK_LLC_FRAMES	200
Router	20	201 nonUnicastin	Nonunicast In	Nonunicast In	198	2 Frames	0//860	DLL_MCASTS	7
Router	20	11 nonUnicastOut	Nonunicast Out	Nonunicast Out	199	2 Frames	0/860	(TR_LLC_FRAMES-DLL_MCASTS) (TR_LOST_FRAME-DLL_FRAMES)-TR_BURST-	8
Router	20	201 otherControlPackets	Other&Control Pkts	Other&Cntrl Pkts	117	2 Frames	oes/ 0	TR_CONGESTION-TR_CONTENTION_STREAMING	33
Router	20	201 reachability	Reachability	Reachability	182	10 Total Time	1(%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	9/
								(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	Š
Router	20	201 reboots	Reboots	Reboots	121	4 Percent	1,00	OLLS+REBOOIS))*DELIA_IIME	1 6
Kouter	2 2	201 slowPacketsIn	Slow PKts In	Slow PKIS III	20 00	2 Frames	O /sec	TR SET RECOVERY MODE	12
Kouter	S	201 IslowPacketsOut	Slow Pkts Out	Til Bytes	124	1 Rydec	298/0		23
Router	120	201 total Frames Discarded	Total Frames Discarded	Til Frms Discard	126	2 Frames	0 /8ec	TR FRAME COPIED	25
Router	20	201 total neomingBytes		Total In Bytes	78	1 Bytes	0/800	OLL_BYTES	2
Router	201	11 total Incoming Packets	Total Incoming Pkts	Total In Pkts	77	2 Frames	0 //sec	DLL_FRAMES	1
Router	20	201 totalInputQueueDrops	Total Input Queue Drops	Tit In Q Drops	81	0 Rate	0/sec	DLL_TRANSITS	
Router	20	201 totalOutgoingBytes	Total Outgoing Bytes	Til Out Bytes	80	1 Bytes	oes/0	(TR_TOKEN-DLL_BYTES)	4 5
Router	20	201 totalOutgoingPackets		Til Out Pkts	60	2 Frames	265/10	IN LOST FRAME-DEL TRAMES)	8
Router	202	201 total Output Queue Drops	Total Output Quede Drops	Ta Out of Diops	115	2 Framos	200/0	DI TRANSITS+DI ENET ERAMES	31
Kouter	201	201 total Queue Droppin Out	Total Queue Dropos macou	Unkn Proto Pkts	104		oes/io	TR LINE	16
Suitch Dire Backniane	200	202 availability		Availability	181		1 (%)	(AVAILABLE_TIME*100.0)	22
Switch Plus Backplane	202	22 backplaneUtilization	Backplane Utilization	Backplane Util	540	4 Percent	1%	DLL_BCASTS	4
Cuetoh Diue Beckelene		202 hadBolls	Bad Polls	Bad Polls	120	4 Percent	1 %	(100.0°BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS))*DELTA_TIME	59
Owici Plus Dackolaria	2 6	Sacrement of the sacrem	alog poop	Slod Pools	118	4 Percent	%	(100.0°GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+REBOOTS))*DELTA_TIME	57
Switch Plus Backplane	200	202 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY	81
Switch Plus Backplane	20	202 missedPolls	Missed Polis	Missed Polls	119	4 Percent	1 %	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME	58
		4	0 40 40 40 40 40 40 40 40 40 40 40 40 40	Reachahilth	182	10 Total Time	1(%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	2/9
Switch Plus Backplane	200	202 Intelligential	Total Bytes	Til Bytes	124	1 Bytes	oes/(0	TR_TOKEN	23
Router CPII	25	250 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*1000)	
	36	250 hadbolls	Rad Polls	Bad Poils	120	4 Percent	1 %	(100.0'BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS))*DELTA_TIME	29
Router CP11	25	O bufferCreateFailures	Buffer Create Failures	Buf Create Fail	93	5 Per Second	1	BYTES_OUT	e ;
Router CP:1	25	250 buffers Used	Buffers Used	Buffers Used	88	6 Buffers	4	TR_CONTENTION_STREAMING	5
					400	A Dorona	7	(FLOAT4(TR_CONTENTION_STREAMING)/FLOA14(TR_BIT	34
Router CPU	25	250 buffer Utilization	Burrer Utilization	Bus Drops	06		-	DLL ALGN ERRORS	11
Kouter CPU	26	250 coul Hiszation	CPU Utilization	CPU Utilization	91	4 Percent	1 %	TR_SET_RECOVERY_MODE	12
Router CPU	25	250 freeMemory	Free Memory	Free Memory	85	7 Bytes	4 (bytes)	TR SIGNAL LOSS*1000.0	98
		i i i	4 TO POOL	Sond Polls	118	4 Percent	7	(100,0°GOOD_POLLS/(GOOD_POLCS****ISSED_FOLCS************************************	57
Router CPU	25,	250 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY	81
				-	•	- A	7	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	85
Router CPU	25	250 missedPolls	Missed Polls	Missed Polis	err .	4 PBroein	6/1.	מיני ליווים מינים ליווים מינים ליווים מינים ליווים מינים	

	Country of the Symmon		inner			200	מיווים ואים וכעו		
Router CPU	250	250 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	ME-100 0:DELTA TIME/TOTAL TIME-1 0)	7.6
							(6, 1)	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	2
Router CPU	250	250 reboots	Reboots	Reboots	121	4 Percent	1%	OLLS+REBOOTS))*DELTA_TIME	60
Router CPU	250	totalBuffers	Total Buffers	Total Buffers	88		4	TR_BIT_STREAMING	14
Router CPU	251	avarlability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	77
Bourton CBII	Č						-	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
Router CP11	750	251 badrolls	Dad Polis	Bad Poils	120	4 Percent	%	POLLS+REBOOTS)) DELTA_TIME	29
O Lo Indiana	167	DIGBUITERHITS	Big Burner Hits	Big Buffer Hits	86	5 Per Second	-	TR_ADDRESS_COPIED	20
Nouter CPO	757	251 bigBufferMisses	Big Buffer Misses	Big Buffer Misse	66	5 Per Second	1	TR_CONGESTION	21
Router CPD	251	bufferCreateFailures	Buffer Create Failures	Buf Create Fail	93	5 Per Second	-	BYTES_OUT	30
Router CPU	251	251 bufferHits	Buffer Hits	Buffer Hits	435	5 Per Second	•	(TR_LINE+TR_ADDRESS_COPIED+TR_INTERNAL+TR_LOS T_FRAME+TR_FREQLIFNCY)	158
								(TR BURST+TR CONGESTION+TR ABORT+TR TOKEN+T	
Router CPU	251	251 bufferMisses	Buffer Misses	Buffer Misses	436	5 Per Second	-	R_FRAME_COPIED)	159
Router CPU	251	251 buffersUsed	Buffers Used	Buffers Used	88	6 Buffers	4	TR_CONTENTION_STREAMING	15
Router CPU	251	251 busDrops	Bus Drops	Bus Drops	90	5 Per Second	1	DLL_ALGN_ERRORS	11
Router CPU	251	cpuUtifization	CPU Utilization	CPU Utilization	91	4 Percent	1%	TR_SET_RECOVERY_MODE	12
Router CPU	251	freeMemory	Free Memory	Free Memory	92	7 Bytes	4 (bytes)	TR_SIGNAL_LOSS*1000.0	86
	720			-	- ;			(100.0°GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	
Pouter CP C	720	goodPolis	Good Polis	Good Polis	81,	4 Percent	1%	D_POLLS+REBOOTS))*DELTA_TIME	57
Douber CPD	797	Zo i nugeBurerHits	Huge Burrer Hits	Huge buffer Hits	102	5 Per Second		TR FREQUENCY	24
Router CP1	722	nugeburerMisses	Huge Burrer Misses	Huge Butter Miss	103	5 Per Second		TR_FRAME_COPIED	25
Double of the state of the stat	100	largebuireinnis	Large builer mis	Lge builer mits	3 3	or second		IK_LOSI_FKAME	77
Pourter Cell	7201	251 rargeburerMisses	Large Burrer Misses	Lge Butter MISS	102	b Per Second		IK TOKEN	23
Douber CP 1	750	ratency	Latency	Latency	802	1 Milliseconds	1 (msec)	LAIENCY	81
Pouter OPU	791	Zo i mediumbunernits	Medium Burier Hits	Med Burner Hits	200	S Per Second		TE ADORT	2 3
	167	mediumbullermisses	Medium burrer Misses	IMed builer Mils	97	o recond	=	14 ABURI	6
Router CPU	251 r	missedPolls	Missed Polls	Missed Polls	119	4 Percent	7 %	AD_POLLS+REBOOTS)*DELTA_TIME	58
Router CPU	251	251 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	76
i	1				-	!		(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	
Router CPU	251	251 reboots	Reboots	Reboots	121	4 Percent	1%	OLLS+REBOOTS))*DELTA_TIME	09
Content of the conten	720	ZOT SMAII BUTTERNITS	Small Buller Hits	Sm buller nits	7 0	DI Second		TR LINE	2
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300 300 300 300 300 300 300 300 300 300	moryUtilization	ysıcal Memory Utilization		2	4 Percent		SOME THE LIGHT CONTROL OF LIGHT AT THE CONTROL	88
300 300 300 300 300 300 300 300 300 300		achability	Physical Memory	160		1 %	100 0"DELIA_IIME"DIL_COLLISIONS/DIL_ENE!_FRAMES	•
300 300 300 300 300 300 300 300 300 300			Reachability	182	10 Total Time	1(%)	(REACHABLE TIME*100.0*DELTA TIME/(TOTAL TIME*1.0))	9/
300 300 300 300 300 300 300 300 300 300			, , , , , , , , , , , , , , , , , , ,	707		7		6
300 300 300 300 300 300 300 300 300 300	+	Small Comm Buffers Dropped	Small Comm Buff	165	5 Per Second	2	TR INTERNAL	9
	+-		Total Bytes	140	1 Bytes	0 /sec	BYTES IN+BYTES OUT	85
		Total Comm Errors	Total Comm Error	163	5 Per Second	-	TR FREQUENCY-TR FRAME COPIED	6
		Total Frames Discarded	Til Frms Discard	126		0 /sec	TR_FRAME_COPIED	22
		Total Incoming Bytes	Total In Bytes	78	1 Bytes	0 /sec	BYTES_IN	28
		Total Incoming Pkts	Total In Pkts	77		0 /sec	PACKETS_IN	27
	Γ	Total Large Comm Buffers	Til Lrge Com Buf	166	5 Per Second	1	TR_ABORT	9
		Total Outgoing Bytes	Til Out Bytes	80	1 Bytes	o /sec	BYTES_OUT	8
		Total Outgoing Pkts	Til Out Pkts	79	2 Frames	0 /sec	PACKETS_OUT	হ্য
	2	Total Physical Memory	Total Phys Mem	144	7 Bytes	4 (bytes)	DLL_ENET_FRAMES	ې پ
		tal Virtual Memory	Total Vir Mem	149	/ Bytes	4 (bytes)	TO DI DOT	1 2
	1	Virtual Memory Used	Vir Mem Used	150	/ Bytes	4 (Dyles)	100 0-DELTA TIME-TO BURSTITE LINE	69
	T	zation	VIII Mem Util	147	4 Percent	0/100	TO BIT STREAMING	4
		Active Confedences	Availability	181	10 Total Time	1 (%)	(AVAILABLE TIME*100 0)	12
		PULIthization	Ava CPU Util	162	4 Percent	1 %	DLL ALGN ERRORS	Ξ
							(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
	B		Bad Polls	120	4 Percent	1 %	POLLS+REBOOTS))*DELTA_TIME	20
			CPU Imbalance	159	4 Percent	%	TR SET RECOVERY MODE	7
	ns	nnections	Dropped Conn	148	0 Rate	0 /sec	TR_CONTENTION_STREAMING	2 3
Server 301 errors			Total Errors	289	2 Frames	o /sec	TR FREQUENCY	4 8
		mpts	Fle Cache Atts	143	0 Rate	O /sec	DEL IRANSITS+DEL XMI OFF FRAMES	3 "
301		File Cache Hits	Fie Cache Mised	141	O Rate	O /sec	DIL AMI OFF FRAMES	1
Server			Cacilo Misson	7	2000		100.0*DELTA_TIME*DLL_TRANSITS/(DLL_TRANSITS+DLL_	
Server 301 fileCacheMissRate		File Cache Miss Rate	File Cache Miss	158	4 Percent	1 %	XMT_OFF_FRAMES)	99

label	element type	symbol	fabel	short label	var_id units	units_Id label	units_type text		loo loo
Server	301 frames	frames	Packets	s	164	2 Frames	oes/ 0	PACKETS_IN+PACKETS_OUT	2
					4,0		70	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	2.5
Server	301	goodPolis		Good Polls	212	4 Percent	7	TE ADDRESS CODIED	2
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Server	301	latency	Latency	Latericy	2007				
	700	200 CF	Aloca to contra	Mesod Dolle	110	4.Percent	7	AD POLLS+REBOOTS) DELTA TIME	58
Server	08	SHO LONG	Wilsago T Oils	Olono Mondo	200	7 Bydoe	(hytoe)	Ī	313
Server	301	301 physicalmemory-ree		Physical Memory	446	7 0,405	Allhidos	T	
Server	301	physicalMemoryUsed	Physical Memory Used	Physical Memory	145	(lbytes	4 (0)(68)	Τ	n
Server	301	301 physical Memory Utilization	Physical Memory Utilization	Physical Memory	160	4 Percent	7	100.0*DELTA_TIME*DLL_COLLISIONS/DLL_ENET_FRAMES	89
Server	301	301 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	76
								(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	
Server	301	reboots	Reboots	Reboots	121	4 Percent	1 %	OLLS+REBOOTS))*DELTA_TIME	9
Server	301	smallCommBuffersDropped	Small Comm Buffers Dropped	Small Comm Buff	165	5 Per Second	-	TR_INTERNAL	9
Server	301	totalBytes	Total Bytes	Total Bytes	140	1 Bytes	0 /sec	BYTES_IN+BYTES_OUT	82
Server	301	totalCommFault	Total Comm Errors	Total Comm Error	163	5 Per Second	-	TR_FREQUENCY-TR_FRAME_COPIED	9
Server	301	totalFramesDiscarded	Total Frames Discarded	Ttl Frms Discard	126	2 Frames	oes/ 0	TR_FRAME_COPIED	25
Server	301	301 totalincomingBytes	Total Incoming Bytes	Total In Bytes	82	1 Bytes	o /sec	BYTES_IN	28
Server	301	totalincomingPackets	Total Incoming Pkts	Total In Pkts	22	2 Frames	0 //860	PACKETS_IN	27
Server	301	301 totalLargeCommBuffers	Total Large Comm Buffers	Til Lrge Com Buf	166	5 Per Second	-	TR_ABORT	19
Server	301	totalOutgoingBytes	Total Outgoing Bytes	Ttl Out Bytes	80	1 Bytes	oes/ 0	BYTES_OUT	೫
Server	301		Total Outgoing Pkts	Ttl Out Pkts	79	2 Frames	oes/ 0	PACKETS_OUT	29
Server	301	totalPhysicatMemory	Total Physical Memory	Total Phys Mem	144	7 Bytes	(bytes)		8
Server	302	302 activeConnections	Active Connections	Active Conn	147	0 Rate	0 //86	TR_BIT_STREAMING	14
Server	302	availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	-
Server	302	302 avgCpuUtilization	Average CPU Utilization	Avg CPU Util	162	4 Percent	1 %	DLL_ALGN_ERRORS	=
								(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	í
Server	302	badPolls	Bad Polls	Bad Polls	120	4 Percent	- 1%	POLLS+REBOOTS))*DELTA_TIME	3 2
Server	302	cpulmbalance		CPU Imbalance	159	4 Percent		TE SOUTHWIND STEPANING	1 4
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			:		4	100000	76	XMT OFF FRAMES!	99
Server	302	302 fileCacheMissRate	File Cache Miss Rate	File Cache Miss	138	2) Eramos	0/10	PACKETS IN+PACKETS OUT	20
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	0		- I - O	Short Polls	118	4 Percent	1 %	D_POLLS+REBOOTS))*DELTA_TIME	27
Server	302	302 Jarge CommBuffers Ised	l aroe Comm Buffers Used	Lrge Com Buf Usd	167	5 Per Second	1	TR_ADDRESS_COPIED	202
Server	302	latency		Latency	208	11 Milliseconds	1 (msec)		E I
Server	200	acricy		Moood Dolla	1	4 Percent	*	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD POLLS+REBOOTS)}*DELTA_TIME	58
Server	302	302 missedPolls	Missed Foils	Olo Logona					32
	302	302 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE TIME*100.0*DELTA TIME/(TOTAL TIME*1.0))	
di va		Company of the Compan	+				_ `	(100.0*REBOOTS/(GOOD_POLLS+MISSED_FOLLS+BAD_F	9
Server	302	reboots		Reboots	121	4 Percent	2 4	TD INTERNAL	18
Server	302	302 smallCommBuffersDropped		Small Comm But	165	5 Per Second	0 /60	RYTES IN-BYTES OUT	85
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Server	302	302 totalCommFault	Total Comm Errors	Turn Commercial	200	Direct Second	- 0	TR FRAME COPIED	25
Server	302	totalFramesDiscarded	Total Frames Discarded	I il Frms Discard	120	4 Bydon		RYTES IN	88
Server	302	totalIncomingBytes	Total Incoming Bytes	Total in Bytes	1,0	Dyles	268/0	PACKETS IN	27
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181 181 182 183 184 184 185	120 120 148 144 144 146 147 148 149 140 140 140 140 140 140 140 140 140 140	Total Time Percent Percent Percent Percent Percent Rate Rate Rate Rate Rate Rate Rate Rat	1 (%) 1 % 1 % 1 % 1 % 0 //sec 0 //sec 0 //sec 0 //sec 1 % 1 % 1 % 1 % 1 % 0 //sec 0 //	(AVAILABLE_TIME*100.0) DIL_ALGN_ERRORS DIL_ALGN_ERRORS TROUGH_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS-REBOOTS)).'DELTA_TIME TR_SET_RECOVERY_MODE TR_FRECOVERY_MODE TR_FRECOVERY_MODE TR_FRECOVERY_MODE TR_FRECOVERY_MODE TR_FRECOVERY_MODE TR_FRECOVERY_MODE TR_FRAMES DIL_XMT_OFF_FRAMES DIL_XMT_OFF_FRAMES DIL_XMT_OFF_FRAMES) PACKETS_IN+PACKETS_OUT XMT_OFF_FRAMES) PACKETS_IN+PACKETS_OUT (100.0FOET A_TIME*OUL_S+MISSED_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+REBOOTS)).'DELTA_TIME LATENCY (100.0FMSSED_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+REBOOTS)).'DELTA_TIME BATES_NHSPTES_OUT TRANESCOOTS_POLLS+MISSED_POLLS+BAD_POLLS+BAD_POLLS+BAD_POLLS+REBOOTS)).'DELTA_TIME BATES_NHSPTES_OUT
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303 leagues Paged Lot Missed Polis Missed Polis 416 303 leagues Paged In Pages Faults 1416 303 leagues Paged In Pages Faults 1416 304 leagues Paged In Pages Fauge In 1416 305 leagues Paged In Pages Faged In 1416 306 leagues Paged Out Pages Paged In 1416 307 leagues Paged Out Pages Paged In 1417 308 leagues Paged Out Pages Paged In 1417 308 leagues Paged Out Pages Paged In 1417 309 leagues Paged Out Pages Paged In 1417 301 leadue Days Reboots Total Byles 1418 302 leadue Days Total Days Total Days 1418 303 leadue Days Total Incenting Byles Total Incenting Byles 1410 304 leave Byles Total Incenting Byles Total Incenting Byles 1411 304 leave Byles Total Incenting Byles Total Days 1418 304 leave Byles Total Incenting Byles Total Pages Faged In 1416 304 leave Byles <	1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(100.7WISSED_POLLS/(GOOD_POLLS+WISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME DLL_ERRORS DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES DLL_FRAMES TIME*10.0*DELTA_TIME(TOTAL_TIME*1.0) (100.7FEBOOTS)*DELTA_TIME BYTES_IN+BYTES_OUT
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303 reboots Reboots Reboots 101 bytes 140			1 % 0 /sec 0 /sec	(100) REDOTS) RECOURT TIME BYTES_IN+BYTES_OUT
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300 local base Total form Errors Total form Error Total commerce			0 /580	
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304 latency Latency Latency Latency Latency Latency 119 304 missedPoils Missed Poils Missed Poils 119 304 pagesPagedut Pages Paged In 136 304 pagesPagedout Pages Paged Out Pages Paged In 136 304 reachability Reachability Reachability 182 304 reboots Reboots Total Bytes 140 304 lotalBytes Total Bytes Total Bytes 140 304 lotalIncomingBytes Total Comm Error 163 304 lotalIncomingBytes Total In Bytes 77		4 Percent	1 %	D_POLLS+REBOOLS))*DEL!A_IIME
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304 pages Paged Interventing Page Faults 146 304 pages Paged Out Pages Paged In 136 304 reachability Reachability Reachability 182 304 rebods 304 total Bytes 304		4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME
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Server	304 virtualMemoryUtilization	Virtual Memory Utilization	Virt Mem Util		4 Percent	1 %	100.0*DELTA TIME*TR BURST/TR LINE	166
Server	305 activeConnections		Active Conn	147	0 Rate	0/sec	TR BIT STREAMING	14
Server	305 availability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE TIME*100.0)	77
Server	305 avgCpuUtilization	Average CPU Utilization	Avg CPU Uiil	162	4 Percent	1%	DLL_ALGN_ERRORS	7
Server	305 badPolls	Bad Polls	Baci Polls	120	4 Percent	***************************************	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS)**PEITA_TIME	ç
Server	305 coulmbalance	CPU Imbalance	CPU Imbalance	159	4 Percent	1 %	TR SET RECOVERY MODE	12
Server	305 droppedConnections	Dropped Connections	Dropped Conn	148	0 Rate	0//860	TR CONTENTION STREAMING	15
Server	305 errors	Total Errors	Total Errors	289	2 Frames	0//sec	ITR FREQUENCY	24
Server	305 fileCacheAttempts	File Cache Attempts	Fie Cache Atts	143	0 Rate	0/960	DLL TRANSITS+DLL XMT OFF FRAMES	63
Server	305 fileCacheHits	File Cache Hits	Fie Cache Hits	141	0 Rate	0/sec	DLL XMT OFF FRAMES	9
Server	305 file Cache Misses	File Cache Misses	Fle Cache Missd	142	0 Rate	0//sec	DLL_TRANSITS	7
				,	,		100.0*DELTA_TIME*DLL_TRANSITS/(DLL_TRANSITS+DLL_	
Server	SOE FORCE CHINESPARE	Total Darkets	Total Dotate	108	4 Percent	% -	XMI_OFF_FRAMES)	9 6
, D	SOO HALLES	I otal Packets	Total Packets	104	zirrames	O /sec	MACKETS_IN+PACKETS_OUT	2
Server	305 goodPolls	Good Polis	Good Polls	118	4 Percent	7	(100.0°GOUD_POLLS/GOUD_POLLS+MISSED_POLLS+BA	57
Server	305 Interrupts	Interrupts	Interrupts	580	0 Rate	0/890	ITR SIGNAL LOSS	13
Server	305 largeCommBuffersUsed	Large Comm Buffers Used	Lrge Com Buf Usd	167	5 Per Second		TR ADDRESS COPIED	20
Server	305 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY	81
	-				- 4		(100 0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	
Server	305 missedPoffs	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME	28
Server	305 pageFaults	Page Faults	Page Faults	146	5 Per Second	-	DLL_ERRORS	2
Server	305 pagesPagedIn	Pages Paged In	Pages Paged In	136	5 Per Second	-	DLL_FRAMES	
Server	305 pagesPagedOut	Pages Paged Out	Pages Paged Out	137	5 Per Second	-	DLL_MCASTS	8
Server	305 pagesSwappedIn	Pages Swapped In	Pages Swd In	138	5 Per Second	-	DLL_BCASTS	4
Server	305 pagesSwappedOut	Pages Swapped Out	Pages Swd Out	139	5 Per Second	-	- 1	2
Server	305 physicalMemoryFree	Physical Memory Free	Phys Memory Free	299	7 Bytes	4 (bytes)	(DLL_ENET_FRAMES-DLL_COLLISIONS)	216
Server	305 physicalMemoryUsed	Physical Memory Used	Physical Memory	145	7 Bytes	4 (bytes)	DLL_COLLISIONS	6
Server	305 physical Memory Hiltzation	Physical Memory I Itilization	Physical Memory	160	4 Percent		100.0*DELTA TIME*DLL COLLISIONS/DLL ENET FRAMES	68
Server	305 processes	丅	Processes	576		4	TR_TOKEN	23
			411	Ş	40 H of H	100	WO PERMIT INTOTACHMENT AT 15000 0000 MINES OF 15000 00000 MINES OF 15000 MI	76
Server	305 reachability	кеаспарниу	Keachability	701	10 10tal 1tm	(02)	(REACHABLE_TIME 100.0 DELIA_TIME(101AL_TIME 1.0))	2
Server	305 reboots	Reboots	Reboots	121	4 Percent	1 %	(100.0 REBOOTS)(GOOD_POLLS+MISSED_POLLS+BAD_P OLLS+REBOOTS))*DELTA_TIME	09
Server	305 runQueueLength	CPU Run Queue Length	Run Queue Length	225	13 Gauge	-	DLL_BYTES	2
Server	305 smallCommBuffersDropped	Small Comm Buffer	Small Comm Buff	165	5 Per Second	-	TR_INTERNAL	18
Server	305 systemCalls	System Calls	System Calls	579	0 Rate	0///	TR_LOST_FRAME	22
Server	305 total Bytes	Total Bytes	Total Bytes	140	1 Bytes	oes/IO	BYTES_IN+BYTES_OUT	82
Server	305 total CommFault	Total Comm Errors	Total Comm Error	163	5 Per Second	1	TR_FREQUENCY-TR_FRAME_COPIED	61
Server	305 totalCpuUtilization	Total CPU Utilization	Total CPU Util	297	4 Percent	4%	TR_LLC_FRAMES	97
Server	305 totalFramesDiscarded	Total Frames Discarded	Tit Frms Discard	126	2 Frames	0 /sec	TR FRAME COPIED	2 8
Server	305 total Incoming Bytes	Total Incoming Bytes	Total in Bytes	2 5	1 Bytes		BY I ES IN	37
Server	305 total Incoming Packets	Total Incoming Pkts	Till PKIS	2,0	Z rrames	n/sec	TACNETO_IN	2 0
Server	305 total Large CommBuffers	Total Large Comm Buffers	Til Cut Budge	991	1 Bytes	10//00	RYTES OUT	3
Server	305 IntelOutgoingBytes	Total Outgoing Bytes	Til Out Dide	2 2	2 Frames	298/0	PACKETS OUT	29
Server	305 total Division Memory	Total Diversal Memory	Total Phys Mem	144	7 Bytes	4 (bytes)	DLL ENET FRAMES	8
Server	305 IntalVirtual Memory	Total Virtual Memory	Total Vir Mem	149	7 Bytes	4 (bytes)	TR_LINE	16
Server	305 users	Users	Users	598	19 Size	4	TR_BIT_STREAMING	14
Server	305 virtualMemoryFree	Virtual Memory Free	Virt Memory Free	009	7 Bytes	4 (bytes)	(TR_LINE-TR_BURST)	217
Server	305 virtualMemoryUsed	Virtual Memory Used	Vir Mem Used	150	7 Bytes	4 (bytes)	TR_BURST	14
Server	305 virtualMemoryUtilization	Virtual Memory Utilization	Virt Mem Util	161	4 Percent	1%	100.0*DELTA_TIME*TR_BURST/TR_LINE	69
Server	306 activeConnections	Active Connections	Active Conn	147	0 Rate	0 /sec	TR BIT STREAMING	4
Server	306 availability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE_TIME*100.0)	7
Server	306 avgCpuUtilization	Average CPU Utilization	Avg CPU Util	162	4 Percent	1%	DIL ALGN ERRORS	
		9100	Rad Polis	120	4 Percent	7	(100.0°BAD_POLLS*MISSED_FOLLS*MISSED_FOLLS*BAD_ POLLS*REBOOTS}}*DELTA_TIME	29
Server	Silo Liberal Coo							

label	element type	symbol	label	short label	var id lunits id	id label	units type text	col_expression	100
Server	306	306 cpulmbalance	CPU Imbalance	CPU Imbalance	159	4 Percent		TR_SET_RECOVERY_MODE	
Server	306	306 droppedConnections	Dropped Connections	Dropped Conn	148	0 Rate	oes/ 0	TR_CONTENTION_STREAMING	
Server	306	errors	Total Errors	Total Errors	289	2 Frames	0/sec	TR_FREQUENCY	24
Server	306	306 file Cache Attempts	File Cache Attempts	Fle Cache Atts	143	0 Rate	oes/ 0	DLL_TRANSITS+DLL_XMT_OFF_FRAMES	
Server	306	fileCacheHits	File Cache Hits	Fie Cache Hits	141	0 Rate	0//sec	DLL_XMT_OFF_FRAMES	
Server	306	306 fileCacheMisses	File Cache Misses	Fte Cache Missd	142	0 Rate	oes/ 0	DLL_TRANSITS	
Server	306	306 fileCacheMissRate	File Cache Miss Rate	File Cache Miss	158	4 Percent	***************************************	100.0*DELTA_TIME*DLL_TRANSITS/(DLL_TRANSITS+DLL_ XMT_OFF_FRAMES)	TRANSITS+DLL_
Server	306	306 frames	Total Packets	Total Packets	164		0 /890	PACKETS_IN+PACKETS_OUT	
Server	906	305 and Polle	Social Bolls	Sood Pools	118	A Dorcont	7	(100.0'GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	SSED_POLLS+BA
Server	306	306 internote	totorinte	Interninte	280		000/10	TP SIGNAL LOSS	
Server	306	306 farmeCommBuffers Ised	Large Comm Buffers Used	I rae Com Buf Usd	167	5 Per Second	1	TR ANDRESS COPIED	
Server	306	306 latency	Latency	Latency	208	11 Milliseconds	1 (msec)		81
Server	306	306 load Average	CPU Load Average	Load Average	574	13 Gaude	-	Ī	
		2		9		9		(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	ISSED_POLLS+B
Server	306	306 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME	
Server	306	306 pageFaults	Page Faults	Page Faults	146	5 Per Second	-	DLL_ERRORS	
Server	306	pageScanRate	Page Scan Rate	Page Scan Rate	578	0 Rate	oes/ 0	TR_CONGESTION	
Server	306	306 pagesPagedIn	Pages Paged In	Pages Paged In	136	5 Per Second	-	DLL_FRAMES	
Server	306	306 pagesPagedOut	Pages Paged Out	Pages Paged Out	137	5 Per Second	-	DLL_MCASTS	
Server	306	pagesSwappedIn	Pages Swapped In	Pages Swd In	138	5 Per Second	1	[DLL_BCASTS	
Server	306	306 pagesSwappedOut		Pages Swd Out	139	5 Per Second	-	DLL_RCV_OFF_FRAMES	
Server	306	306 physical Memory Free	Physical Memory Free	Phys Memory Free	599	7 Bytes	4 (bytes)		216
Server	306	physicalMemoryUsed	Physical Memory Used	Physical Memory	145	7 Bytes	4 (bytes)	s) DLL_COLLISIONS	
Server	308	306 physical Memory Blization	Dhysical Memory I Wilization	Physical Memory	160	4 Percent		100 0*DELTA TIME*DIL COLLISIONS/DI	FRAMES
Source	306	206 processor		Brocesses	576	10 5,75		TO TOKEN	23
Server	900	processes	710068868	10000000	2	870		Name of the second seco	
Server	306	306 reachability	Reachability	Reachability	182	10 Total Time	1(%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	TOTAL_TIME-1.0)) /6
Server	308	306 rehoots	Reboots	Rehnofs	121	4 Percent	- %	(100.0*REBOOTS/(GOOD_POLLS+MISSEI OLLS+REBOOTS))*DELTA TIME	
Contor	308	rmall CommBriffers Dronned		Small Comm Ruff	165	5 Per Second	-	TR INTERNAL	18
Server	306	systemCalls	System Calls	System Calls	579	0 Rate	0 /sec	TR_LOST_FRAME	22
Server	3061	306 totalBytes	Total Bytes	Total Bytes	140	1 Bytes	oes/ 0	BYTES_IN+BYTES_OUT	58
Server	3061	306 totalCommFautt	Total Comm Errors	Total Comm Error	163	5 Per Second	-	TR_FREQUENCY.TR_FRAME_COPIED	
Server	3061	306 totalCpuUtilization	Total CPU Utilization	Total CPU Util	265	4 Percent	1 %	TR_LLC_FRAMES	26
Server	306	306 total Frames Discarded	Total Frames Discarded	Til Frms Discard	126	2 Frames	oes/lo	TR_FRAME_COPIED	
Server	306	306 totalincomingBytes	Total Incoming Bytes	Total In Bytes	78	1 Bytes	0 /sec	BYTES_IN	28
Server	306	306 totalincomingPackets	Total Incoming Pkts	Total In Pkts	77	2 Frames	oes/ 0	PACKETS IN	2.
Server	306 t	306 totalLargeCommBuffers	Total Large Comm Buffers	Ttl Lrge Com Buf	166	5 Per Second	-	TR_ABORT	
Server	306	306 totalOutgoingBytes	Total Outgoing Bytes	Tit Out Bytes	80	1 Bytes	0 /sec	BYTES_OUT	08
Server	3061	306 totalOutgoingPackets	Total Outgoing Pkts	Til Out Pkts	62	2 Frames		T	
Server	3061	306 total Physical Memory	Total Physical Memory	Total Prys Mem	444	/ Bytes	4 (Dy(85)	S DEL ENET FRANCES	
Server	306	306 total Virtual Memory	Total Virtual Memory	Lora VIF IMETT	149	10 5,20	41(0)(83)	T	
Server	300	306 users	Users	Vid Momon, Eros	080	7 Bidee	4 (hutae)	TR INF.TR RIBST)	24.
Server	3000	virtualmemory-ree	Virtual Memory Leed	Vir Mem Used	450	7 Rytes	4 (bytes)	Г	
Server	300	306 virtuelMemory Hilration	Wittel Memory Hilization	Virt Mem Util	161	4 Percent	1 %	1	69
Sarver CPI 1	330,8	330 availability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE_TIME*100.0)	
				170	33	-	7	(100.0°BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
Server CPU	33011	330 badPoils	Bad Polls	Dad Polis	021	A Porcont	8 8	AVTEC IN	
Server CPU	330(330 cpuldleUtilization	CPU Idle Utilization	CPO Idle Oill	583	4 Percent	%	TR 11C FRAMES	26
Server CPU	3300	330 cpusystemunization	CPU Liser Hiltzation	CPU User Util	582	4 Percent	1 %	TR FRAME COPIED	
Server Cell	33015	330 chul litration	CPU Hilization	CPU Utilization	128	4 Percent	1 %	TR FREQUENCY	
Server CP11	33010	330 couWartUtilization	CPU Wart Utilization	CPU Wait Util	584	4 Percent	1 %	PACKETS_IN	
					,		3	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	SED_POLLS+BA 57
Server CPU	330	330 goodPolls	Good Polls	Good Polis	218	4 Fercent	1 %	D_FOLLS*REBOOLS// DEELO, IIME	

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BMC UNIX Partition Disk Disk Disk Disk Disk Disk Disk Disk	353 reboots 370 availability 370 badPolls 370 diskAvgTransferSize 370 diskAvgTransferTime 370 diskBusyTrane	Reboots Availability Bad Polls Average Transfer Size Average Transfer Time Disk I/O Busy Utilization Bytes Transferred Disk Reads Disk Reads Disk Reads Disk Reads Disk Reads Disk Storage Capacity Storage Erea Storage Used	Repoots Availability Bad Polls	121	4 Percent 10 Total Time	1%	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+REBOOTS)/DELTA_TIME
Disk Disk Disk Disk Disk Disk Disk Disk	370 availability 370 badPolls 370 diskAvgTransferSize 370 diskAvgTransferTime 370 diskBuysTrane 370 diskBuysTrane 370 diskBytesTransferred 370 diskBytesTransferred 370 diskBytesTransferred 370 diskRadsWrites 370 diskRadsWrites 370 diskRadsWrites 370 diskRadsWrites 370 diskRadsWrites 370 diskRadsWrites 370 diskStorageCapacity	Avarlability Bad Polis Average Transfer Average Transfer Disk I/O Busy Utili Disk Faults Disk Faults Disk Reads Disk Reads Disk Reads Disk Reads Disk Reads Storage Cap Storage Lee Storage Lee	Availability Bad Polls		10 Total Time	1 (%)	VAVAITABLE TIME*100 0\
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskAvgTransferSize 370 diskAvgTransferSize 370 diskAvgTransferTime 370 diskBusyTrans 370 diskFaulis 370 diskFaulis 370 diskReads 370 diskReads 370 diskReads 370 diskStorageCapacity 370 diskStorageCapacity 370 diskStorageFrea 370 diskStorageFrea 370 diskStorageFrea 370 diskStorageFrea 370 diskStorageFrea	Bad Polls Average Transfer Average Transfer Average Transfer Disk I/O Busy Util Bytes Transferred Disk Readts Disk Readts Disk Reades Disk Reades Disk Reades Disk Storage Cap Storage Lee	Bad Polls			/n/ \1.	(מאורבים וווור וססים)
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskAvgTransferSize 370 diskAvgTransferTime 370 diskBveTransferred 370 diskBveTransferred 370 diskBveTransferred 370 diskBveTransferred 370 diskRedsWrites 370 diskRedsWrites	Average Transfer Average Transfer Disk I/O Busy Utili Disk I/O Buse I/O Disk Faults Disk Reads Disk Reads Disk Reads Disk Reads Disk Reads Disk Storage Cap Storage Used		120	4 Percent	%	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+REBOOTS))*DELTA_TIME
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskAvgTransferTime 370 diskBusyTime 370 diskBytesTransferred 370 diskRaulis 370 diskRaulis 370 diskRadsWrites 370 diskRadsWrites 370 diskRadsWrites 370 diskRadsWrites 370 diskRadsWrites 370 diskStorageCapacity 370 diskStorageFee 370 diskStorageFee	Average Transfer Disk I/O Busy Utili Disk Faults Disk Faults Disk Readsewrite Disk Readsewrite Disk Readsewrite Disk Storage Cap. Storage Lee Storage Lee	Avg Xfer Size	714		oes/ 0	DELTA_TIME*DLL_BYTES/BYTES_OUT
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskBusyTime 370 diskBylesTransferred 370 diskFaulis 370 diskFaulis 370 diskReads 370 diskReads 370 diskReadswirtes 370 diskStorageCapacity	Disk I/O Busy Utili Byes Transferred Disk Faults Disk I/O Queue Lc Disk Reads&Write Disk Reads&Write Disk Storage Cap Storage Free Storage Used	Avg Xfer Time	715	13 Gauge	-	1000.0*DELTA_TIME*DLL_MCASTS/BYTES_OUT
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskBytes Transferred 370 diskFaulis 370 diskRoads 370 diskRoads 370 diskRoadsWrites 370 diskStorageCapacity 370 diskStorageEree 370 diskStorageUsed 370 diskStorageUsed		Disk Busy Time	267	4 Percent	1%	100,0*DLL_MCASTS
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskFaults 370 diskRoueueLength 370 diskRoueueS 370 diskRorageCapacity 370 diskStorageFree 370 diskStorageFree 370 diskStorageFree 370 diskStorageUse		Bytes Xferd	703		0//86	DLL_BYTES
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskReads 370 diskReads 370 diskReadsWrites 370 diskReadsWrites 370 diskStorageCapacity 370 diskStorageFree 370 diskStorageFree 370 diskStorageUse		Disk Faults	135	5 Per Second	1	PACKETS IN
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskReadsWrites 370 diskReadsWrites 370 diskStorageCapacity 370 diskStorageFree 370 diskStorageFree 370 diskStorageUtization		Disk of Length	200	U Kate	200/0	DLL_BCASIS
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskStorageTree 370 diskStorageFree 370 diskStorageTree 370 diskStorageUsed 370 diskStorageUsed		Disk Reads	134	O Rate	0 /366	מיונס פון איניס פון איניס פון איניס פון איניס
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskStorageUsled 370 diskStorageUsled 370 diskStorageUtlitzation		Disk Read & Write	130	7 Pudos	0/Sec	TO EDECLIENCY
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Disk Disk Disk Disk Disk Disk Disk Disk	370 diskStorageUtilization		Storage Head	710	7 Bytes	4 (bytes)	TO EDAME COOLED
Disk Disk Disk Disk Disk Disk Disk Disk	370 diskStorageUtilization		Sioi age Oseo	2	/ IDytes	4 (Dyles)	
Disk Disk Disk Disk Disk Disk Disk Disk	070 4-1147-4-2		Disk Stor Util	131	4 Percent	***	100.0*DELTA_TIME*TR_FRAME_COPIED/TR_FREQUENCY
Disk Disk Disk Disk Disk Disk Disk Disk	3/U diskwrites		Disk Writes	133	0 Rate	0/sec	PACKETS_OUT
Disk Disk Disk Disk Disk Disk Disk Disk	370 goodPolls	Good Polls	Good Polls	118	4 Percent	%1	(100.0*GOOD_POLLS/GOOD_POLLS+MISSED_POLLS+BA D_POLLS+REBOOTS))*DELTA_TIME
Disk Disk Disk Disk Disk Disk	370 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY
Disk Disk Disk Disk Disk	370 missedPolls	Missed Polls	Missed Polfs	119	4 Percent	1 %	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME
Disk Disk Disk Disk Disk	020 020	- Hilderica C	Occupation	782	10 Total Time	1/0//	(PEACHABLE TIME 100 0:DELTA TIME (TOTAL TIME 10))
Disk Disk Disk Disk Disk	Stolleadiability	Nodel lability	A CORPORATION OF THE PROPERTY			(2)	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P
Disk Disk Disk	370 reboots	Reboots	Reboots		4 Percent	1%	OLLS+REBOOTS))*DELTA_TIME
Disk Disk Disk	371 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)
Disk Disk	371 badPolls	Bad Polls	Bad Polls	120	4 Percent	*	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS))*DELTA_TIME
Disk	371 diskReadsWrites	Disk Reads&Writes	Disk Read&Write	134	0 Rate	oes/(0	BYTES_OUT
	371 goodPolls	Good Polls	Good Polls	118	4 Percent	%	(100.0*GOOD_POLLS/(GÖÖD_POLLS+MISSED_POLLS+BA D_POLLS+REBOOTS))*DELTA_TIME
Disk	371 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY
Š	371 missedPolls	Missed Polis	Missed Polls	119	4 Percent	1%	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME
4	27.0	444	Deschability	182	10 Total Time	1 (%)	(REACHABLE TIME-100 0-DELTA TIME/(TOTAL TIME-1.0))
UISK	37 I reachability	Neachaonny	(Vegeriaciiny				(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P
Disk	371 reboots	Reboots	Reboots		4 Percent	1 %	OLLS+REBOOTS))*DELTA_TIME
Server LAN	502 availability	Availability	Availability		10 Total Time	(%)	(AVAILABLE LIME 100.0)
Server LAN	502 avgFrameSize	Average Frame Size	Avg Frame Salze	700	7 Bytes	4 (bytes)	DELIA TIME IN RYTES/DII FRAMES
Server LAN	ouz avgrrameoizem	Average Frants Size III	10 Dist. B		Social	(a) (a)	DELTA_TIME*(TR_TOKEN-DLL_BYTES)/(TR_LOST_FRAME-
Server LAN	502 avgFrameSizeOut	Average Frame Size Out	Avg Frame Sz Out	702	7 Bytes	4 (bytes)	DLL_FRAMES)
	ECO Lead off	3 T C C C C C C C C C C C C C C C C C C	Bad Polls	120	4 Percent	18	(100.0°BAD_POLLS(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS))*DELTA_TIME
Server LAN	502 bandwidth	Bandwidth Utilization	BW Util	209		1 %	((TR_TOKEN*8*100.0)/\$(speed))
Server AN	502 bandwidthin	Bandwidth Utilization In	Bw Util In		4 Percent	1 %	((DLL_BYTES*8*100.0)/\$(speedin))
Server LAN	502 bandwidthOut	Bandwidth Utilization Out	BW Util Out		4 Percent	1 %	(((TR_TOKEN-DLL_BYTES)*8*100.0)/\$(speedOut))
Server LAN	502 bits	Bits	Bits		15 Bits	0/890	(TR_TOKEN*8.0)
Server LAN	502 bitsin	Bits In	Bits In	438	15 Bits	oes/0	(DLL_BYTES*8.0)
Server LAN	502 bitsOut	Bits Out	Bits Out		15 Bits	ol/sec	TO TOKEN-DILL BY LES) 8.0)
Server LAN	502 bytes	Bytes	Bytes Bytes Is	18	1 Bytes	0/890	DI BYTES
Server LAN	502 bytesin	Bytes In	Bytes III	20 20	1 Bytes	0/sec	(TR TOKEN-DLL BYTES)
Server Chin	out Dyeardar	30000					100.0*DELTA_TIME*DLI_RCV_OFF_FRAMES/(TR_LOST_F
Server LAN	502 collisionsOutPct	Collisions (out) %	Collisions Out %	720	4 Percent	1%	RAME-DLL_FRAMES)

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SOCIOLEMENTON TOTAL TOTA	Server LAN	502	discardedFrames	Discarded Frames	Discarded Frames	57	2 Frames	units_type text	TO EDAME CORIED	00
500 (describinity) Discision in W. Observed in W. Observed in W. Coloration in W. 572 (Percentity) 1 Percent 1 Percent <td>Server LAN</td> <td>502 0</td> <td>JiscardsIn</td> <td>Discards In</td> <td>Discards In</td> <td>196</td> <td>2 Frames</td> <td>296/0</td> <td>DI COLLEGAIS</td> <td>श</td>	Server LAN	502 0	JiscardsIn	Discards In	Discards In	196	2 Frames	296/0	DI COLLEGAIS	श
502 Identification Discrete Out % Discrete Out % Cycle	Server LAN	502 0	liscardsInPct	Discards In %	Discards in %	529	4 Percent	1%	100.0*DELTA TIME*DII COLLISIONS/DII ERAMES	10,
902 Districted Colin W. Observed Out W. \$551 A percent 1 % 802 Districted Colin W. Emers D. Control District Colin W. \$202 Christone 0 / 100 months 802 Interval Colin Colin M. Emers D. Emers D. Emers D. 522 Christone 0 / 100 months 802 Interval Colin Colin M. Emers D. Emers D. Emers D. 1 / 100 months 0 / 100 months 802 Interval Colin Colin Colin M. Emers D. Emers D. 1 / 100 months 0 / 100 months <td< td=""><td>Server LAN</td><td>502 0</td><td>InscardsOut</td><td>Discards Out</td><td>Discards Out</td><td>197</td><td>2 Frames</td><td>0 /sec</td><td>(TR_FRAME_COPIED-DLL_COLLISIONS)</td><td>83</td></td<>	Server LAN	502 0	InscardsOut	Discards Out	Discards Out	197	2 Frames	0 /sec	(TR_FRAME_COPIED-DLL_COLLISIONS)	83
Statement	Server	2	in Cartain Cartain	Č	(7			100.0*DELTA_TIME*(TR_FRAME_COPIED.	
SSD promotived Enters On Free Control Frames in Free Control Frames in F	Server LAN	502	uscarus Outroi	Unscards Out %	Discaros Out %	531	4 Percent	1%	3)/(TR_LOST_FRAME-DILL	193
SIGN Controlled Errors in St. Errors	Server LAN	502	errorsin	Firors In	From la	243	2 Frames	ol/sec	IK FREQUENCY	24
Single interval	Server LAN	502	arrorsInPct	From h	From In %	530	4 Percent	Ol/sec	DUL ERRORS	2
SOCI Processor Control Contr	Server LAN	502 e	errorsOut	Errors Out	Frors Out	212	2 Frames	9/ 1- 0	TOU.U-DELIA IIME-DIL ERRORS/DIL FRAMES	192
SOCI procedured in Finance of Soci Polis (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI Polison) Finance of American Control of Soci Polison (SOCI						4		2000	100 0*DE! TA TIME*/TR ERECIENCY.	64
Size Transmish Frames Frames Frames Frames Glace	Server LAN	205 €	arrorsOutPct	Errors Out %	Errors Out %	532		7	DLL ERRORS//TR LOST FRAME-DIT FRAMES)	101
SQS (Composition) Finance in Finance in Finance in Good Polis Finance in Finance in Finance in Finance in Good Polis Finance in Finance in Finance in Good Polis	Server LAN	502 ft	rames	Frames	Frames	1	2 Frames	0//sec	TR LOST FRAME	200
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502 good-Polis Good Polis Good Polis Good Polis 116 4 Percent 1 % 502 Inseed Polis Lalency Lalency Lalency Lalency 1 % 1 (mess) 502 Inseed Polis Monumest In Monumest In Monumest In 1 % 1 (mess) 502 Institutional Control Nonumest In Monumest In 1 % 1 (mess) 502 Institutional Control Nonumest In Monumest In 1 % 1 (mess) 502 Institutional Control Reduction In Nonumest In 1 % 1 (mess) 502 Institutional Control Reduction In Reduction In 1 % 1 (mess) 502 Institutional Control Analysis 1 % 1 (mess) 1 (mess) 503 Institutional Control Analysis 1 % 1 (mess) 1 (mess) 504 Institution In Analysis 1 % 1 (mess) 1 (mess) 504 Institution In Analysis 1 % 1 (mess) 1 (mess) 505 Institutional Control Analysis 1 (mess) 1 (mess) 1 (mess) </td <td>Server LAN</td> <td>502 fr</td> <td>ramesOut</td> <td>Frames Out</td> <td>Frames Out</td> <td>29</td> <td>2 Frames</td> <td>oes/ 0</td> <td>(TR_LOST_FRAME-DLL FRAMES)</td> <td>82</td>	Server LAN	502 fr	ramesOut	Frames Out	Frames Out	29	2 Frames	oes/ 0	(TR_LOST_FRAME-DLL FRAMES)	82
SQL between Street St	Server I AN	2002	ollogio	1	0				(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	
SIZE Interest@Politic Massed Politic June 10, 10, 10, 10, 10, 10, 10, 10, 10, 10,	Server LAN	502	atency	Total Total	Good Polis	900	4 Percent		ID_POLLS+REBOOTS))*DELTA_TIME	22
SCO [non-bluesat] Makesd Polis Manuacation Manuacation <td></td> <td></td> <td>6</td> <td>Caracitos</td> <td>Laterilley</td> <td>200</td> <td>r r MIIIISeconds</td> <td>1 (msec)</td> <td>LAIENCY</td> <td>81</td>			6	Caracitos	Laterilley	200	r r MIIIISeconds	1 (msec)	LAIENCY	81
SGC includinest Nonunicast Nonunicast Nonunicast Nonunicast Operation SGC includinest(but Nonunicast of the control	Server LAN	502 n	nssedPolls	Missed Polls	Missed Polis	119		*	(100.0"MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	ů
502 Inconfunestith Norunicast In Norunicast In Norunicast In Norunicast In Norunicast Out Norunicast Out 1999 2 Firmnes 0 / Isea 502 Reschability Reachability Reachability Reachability 10 / Isea 0 / Isea 0 / Isea 502 Reboots Reboots 10 / Isea 1 / Isea <t< td=""><td>Server LAN</td><td>502 in</td><td>ionUnicast</td><td>Nonunicast</td><td>Nonunicast</td><td>99</td><td>2 Frames</td><td>0//sec</td><td>DI BCASTS</td><td>5</td></t<>	Server LAN	502 in	ionUnicast	Nonunicast	Nonunicast	99	2 Frames	0//sec	DI BCASTS	5
State	Server LAN	502 n	ionUnicastln	Nonunicast In	Nonunicast In	198	2 Frames	0/800	DLL MCASTS	e.
SGZ eachability Reachability Reachability Reachability Reachability Reachability 10 Total Time 1 (%) SGZ unknownProtocolPackers Reboots Uhren Proto Pates 121 4 Percent 1% SGZ unknownProtocolPackers Amerage Frame Size Andrability 181 10 Trotal Time 1 (%) SGZ unknownProtocolPackers Amerage Frame Size Andrability 181 10 Trotal Time 1 (%) SGZ unknownProtocolPackers Amerage Frame Size out Andrability 181 10 Trotal Time 1 (%) SGZ unknownProtocolPackers Amerage Frame Size out Andrability 181 10 Trotal Time 1 (%) SGZ unknownProtocolPackers Amerage Frame Size out And Frame Size And Frame Size 1 (%) 1 (%) SGZ bastrowlich Bast Polis Bast Polis 1 (%) 1 (%) 1 (%) SGZ bastrowlich Bast Polis 1 (%) 1 (%) 1 (%) 1 (%) SGZ bastrowlich Bastrowlich Bis but Dis 1 (%) 1 (%) 1 (%) SGZ bastrow	Server LAN	502 n	ionUnicastOut	Nonunicast Out	Nonunicast Out	199		0 /sec	(DLL_BCASTS-DLL_MCASTS)	84
502 Indoord Reboots Reboots 127 Intermed Trans 1 (%) 502 InstrumedProtocolPackels Unknown Protocol Pits Unknown Protocol Pits 164 2 France 1 (%) 502 InstrumedProtocolPackels Average France Size In	Server LAN	502	eachability	Reachability	Doorhobility	607	10 Total Times	707		1
SSQ Pabolots Reboots Reboots Reboots Reboots Reboots 178 4 Percent 1 % 502 availability 504 availability Availability 160 2 Francis 178 1 Kyles 1 (kg) 504 availability Availability Availability 170 7 Bytes 4 (bytes) 504 availability Avarage Francisca Avarage Francisca Avarage Francisca Availability 1 (kg) 7 (kg) 7 (kg) 4 (kg) 504 availability Avarage Francisca Avarage Francisca Avarage Francisca Availability 2 (kg) 4 (kg)			6	Amongo	1 decriently	102	יס ומו וווופ	(2/2)	(KEACHABLE_ IIME 100.0-DELIA_ IIME(101AL_ IIME 10))	9/
502 unknown/Potocol/Packets Unknown Protocol Packets Availabilities Availabilities Total Time O (sec 504 availabilities Average Frame Size in Availabilities Availabilities Availabilities Availabilities Availabilities Availabilities A (plass) A (Server LAN	502 16	eboots	Reboots	Reboots	121		%	(100.0*REBOO!S/(GOOD_POLLS+MISSED_POLLS+BAD_P) OLLS+REBOOTSN*DFITA TIME	9
Sold availability Availabi	Server LAN	505 u	nknownProtocolPackets		Unkn Proto Pkts	104	2 Frames	0/860	TR LINE	16
504 BordFrameSize Average Frame Size Avg Frame Size Avg Frame Size 701 7 Bytes 4 (bytes) 504 BordFrameSizeOut Average Frame Size Out Avg Frame Size Out 701 7 Bytes 4 (bytes) 504 BordFrameSizeOut Average Frame Size Out Avg Frame Size Out 702 7 Bytes 4 (bytes) 504 Bordwidth Bad Polis Bad Polis 120 4 Percent 1 % 504 Bordwidth Bandwidth Utilization in BW Util In 210 4 Percent 1 % 504 Bordwidth Bandwidth Utilization out BW Util In 210 4 Percent 1 % 504 Bordwidth Bandwidth Utilization out BW Util In 211 4 Percent 1 % 504 Bordwidth Bandwidth Utilization out BW Util In 210 4 Percent 1 % 504 Bordwidth Bandwidth Utilization out BW Util In 210 4 Percent 1 % 504 Bordwidth Bliss In BW Util In 439 15 Bits 1 % 504 Bordwidth Bliss In Bly Bord Bytes 2	Server LAN	504 a	vailability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE_TIME*100.0)	11/2
504 avgFrameSizeIn Average Frame Size In Avg Frame Size In Avg Frame Size In Avg Frame Size Out Avg Frame Size Out Avg Frame Size Out 702 7 Bytes 4 (bytes) 504 badPoils Bad Poils Bad Poils Bad Poils 120 4 Percent 1 % 504 bandwidthin Bandwidth Unitization in Soft bins But Util In 210 4 Percent 1 % 504 bins Bins Out Bins In Bins Out 4 Percent 1 % 504 bins Bins Out Bins Out Bins Out 437 15 Bits 0 /sec 504 bins Bins Out Bins Out 437 15 Bits 0 /sec 504 bins Bins Out Bins Out 439 15 Bits 0 /sec 504 bins Bins Out Bins Out 4 /sec 0 /sec 0 /sec 504 bins Bins Out Bins Out Bins Out 20 1 Bives 0 /sec 504 discards/out Discards i	Server LAN	504 a	vgFrameSize	Average Frame Size	Avg Frame Size	7007	7 Bytes	4 (bytes)	DELTA TIME TOKEN/TR LOST FRAME	311
504 avgFrameSizeOut Average Frame Size Out Avg Frame Size Out Avg Frame Size Out Avg Frame Size Out 4 (bytes) 504 bad-bodidith Bad Polis Bad Polis 120 4 Percent 1 % 504 bandwidth Bandwidth Utilization BW Util In 210 4 Percent 1 % 504 bandwidthOut Bandwidth Utilization Frame BW Util Out 211 4 Percent 1 % 504 blish Bins in	Server LAN	504 8	vgFrameSizeIn	Average Frame Size In	Avg Frame Sz In	701	7 Bytes	4 (bytes)	DELTA_TIME*DLL_BYTES/DLL_FRAMES	310
50d badPoils Bad Poils Bad Poils 170 4 Percent 1 % 50d bandwidthin Bandwidth Utilization In BW Util In 209 209 4 Percent 1 % 50d bandwidthin Bandwidth Utilization In BW Util Out 211 4 Percent 1 % 50d bits Bits in Discorded In Bits and Bi	Server LAN	504	voFrameSizeOut	Average Frame Size Out	Avo Frame Sz Out	202	7 Bytas	4 (hydee)	DELTA_TIME*(TR_TOKEN-DLL_BYTES)/(TR_LOST_FRAME-	906
504 badPoils Bad Poils Bad Poils 120 4 Percent 1 % 504 bandwidth Bandwidth Bandwidth Unitzation in BW Util in 210 209 4 Percent 1 % 504 bandwidthOut Bandwidth Unitzation in Bull in Bandwidth Unitzation in Bull in					50 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0	1	2007	1(5)(63)	(100 0*BAD POLIS//GOOD POLIS+MISSED POLIS+BAD	3
504 bandwidth Bandwidth Utilization BW Util In 210 4 Percent 1 % 504 bandwidthin Bandwidth Utilization Out BW Util In 210 4 Percent 1 % 504 bandwidthOut Bisnowidth Utilization Out BH Will Out 211 4 Percent 1 % 504 biss Bisnowidth Utilization Out BH Will Out 217 4 Percent 1 % 504 bissour Biss Out Biss Out Biss Out 439 15 Bits 0 /sec 504 bissour Bytes Bytes 1 Bytes 0 /sec 0 /sec 504 bissour Bytes In Bytes In Bytes In 1 Bytes 0 /sec 504 collisionsOutPct Collisions Out's 7 2 Frames 57 2 Frames 0 /sec 504 discardedFrames Discards In Bytes In Bytes In 1 % 504 discardsOutPct Collisions Out's 57 2 Frames 0 /sec 504 discardsOutPct Discards In 1 % 1 % 504 discardsOutPct Discards Out's 52 Prames 0 /sec	Server LAN	504 b	adPolls	Bad Polls	Bad Polls	120	4 Percent		POLLS+REBOOTS))*DELTA_TIME	59
50d leandwidthin Bandwidth Utilization Out BW Util Out 210 4 Percent 1 % 50d bits Bandwidth Utilization Out BW Util Out 211 4 Percent 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d bits Bits Bits Bits 1 % 1 % 1 % 50d discards Bits Bits Bit	Server LAN	504 b	andwidth	Bandwidth Utilization	BW Util	209	4 Percent	1 %	((TR_TOKEN*8*100.0)/\$(speedTotal))	79
504 blandwidth Out Bandwidth Utilization Out BM Util Out 211 4 Percent 1 % 504 bliss Bils Bils Bils 0 Jisec 0 Jisec 504 bliss Bils Bils 0 Jisec 0 Jisec 0 Jisec 504 blisout Bils Out Bils Out 438 15 Bils 0 Jisec 504 bytes Bytes Bytes 1 Bytes 0 Jisec 0 Jisec 504 bytes Bytes Bytes 0 Jisec 0 Jisec 0 Jisec 504 bytesOut Bytes In Bytes Out Bytes Out 20 Jisec 1 Bytes 0 Jisec 504 discardedFrames Discards Frames Discards Frames 57 Zirames 2 Frames 0 Jisec 504 discardsofted Discards In Discards In Discards In Discards In Discards In Jisec 2 Frames 0 Jisec 504 discardsofted Discards In Discards Out Discards Out 1 Jisec 1 Jisec 1 Jisec 504 discardsOut Errors Errors In 2 Jisec	Server LAN	504 b	andwidthIn	Bandwidth Utilization in	BW Util In	210	4 Percent	1 %	((DLL_BYTES*8*100.0)/\$(speedIn))	78
Sold bills Bilts Bits Bits Bits Bits A 37 15 Bits 0 /sec 504 birsourt Bits Out Bits Out Bits Out Bits Out A 39 15 Bits 0 /sec 504 birsourt Bytes Bytes Bytes 0 /sec 0 /sec 504 bytes Bytes Bytes 0 /sec 0 /sec 0 /sec 504 bytesin Bytes out Bytes out 0 /sec 1 Bytes 0 /sec 504 bytesin Bytes out Bytes out 0 /sec 1 Bytes 0 /sec 504 discards/frames Discarded Frames Discarded Frames 0 /sec 1 /sec 504 discards/bir/ct Discards Out 0 /sec 1 /sec 1 /sec 504 discards/but Discards Out 0 /sec 1 /sec 1 /sec 504 discards/but Discards Out Errors 2 /sec 1 /sec 504 errors Errors Errors 2 /sec 1 /sec 1 /sec 504 errors Errors Out Errors Out <td< td=""><td>Server LAN</td><td>504 b</td><td>andwidthOut</td><td>dth Utilizat</td><td>BW Util Out</td><td>211</td><td>4 Percent</td><td>1 %</td><td>(((TR_TOKEN-DLL_BYTES)*8*100.0)/\$(speedOut))</td><td>80</td></td<>	Server LAN	504 b	andwidthOut	dth Utilizat	BW Util Out	211	4 Percent	1 %	(((TR_TOKEN-DLL_BYTES)*8*100.0)/\$(speedOut))	80
504 lotisin Bits in 438 15 Bits 0 //sec 504 lotisout Bits Out Bits Out Bits Out 20 1 Bytes 0 //sec 504 lotisout Bytes in Bytes in Bytes in Bytes 0 //sec 0 //sec 504 lotisors Coults on Social de Frames 504 collisions Cout) % Collisions Out % 720 4 Percent 1 //sec 1 //sec 504 discarded rames Discarded Frames 57 2 Frames 0 //sec 0 //sec 504 discards lined Discards frames Discards In Discards In 1 //sec 1 //sec 0 //sec 504 discards Out Discards Out Discards Out Discards Out 331 4 Percent 1 //sec 0 //sec 504 errors Errors Errors Errors 532 4 Percent 1 //sec 0 //sec 1 //sec 1 //sec 504 errors Errors Errors Errors Errors 2 //sec 1 //sec	Server LAN	504 b	Its	Bits	Bits	437	15 Bits	01/sec	(TR_TOKEN*8.0)	161
504 bytest	Server LAN	504 B	itsin	Bits in	Bits in	438	15 518	01/sec	(OLL_BYIES-8.0)	160
504 bytesin Bytes in	Server I AN	304 D	ItsOut	Birs Out	Bidge	438	15 Britis	Ol/sec	TE TOKEN	23
504 joylesOut Bytes Out Bytes Out 20 1 Bytes 0 /sec 604 joylesOut Collision South Collisions Out % 7 20 4 Percent 1 /sec 504 jorlacandes/Frames Discardes Frames 57 2 Frames 0 /sec 504 discardsInPct Discards In % Discards In % 196 2 Frames 0 /sec 504 discardsOut Discards Out Discards Out Discards Out 1 /se 2 Frames 0 /sec 504 discardsOutPct Discards Out % 531 4 Percent 1 /sec 0 /sec 504 enrors Enrors Enrors Enrors Enrors 1 /sec 1 /sec 504 enrors Enrors In Enrors In Enrors In Enrors In Enrors In 1 /sec 504 enrorsOut Enrors Out Enrors Out 2 /sec 1 /sec 1 /sec 504 enrorsOut Enrors Out Enrors Out 2 /sec 1 /sec 1 /sec 504 ferrors Frames Frames Frames 0 /sec 1 /sec	Server AN	504 h	ytes	Bytes In	Bytes In	187	1 Bytes	0/86/0	DI BYTES	3
604 collisionsOutPct Collisions (out) % Colli	Server LAN	504 b	ytesOut	Bytes Out	Bytes Out	50	1 Bytes	oes/0	(TR_TOKEN-DLL_BYTES)	74
SOID collisions Out Pct Collisions (out) % Collisions Out % 72D 4 Percent 1 % 504 discarded Frames Discarded Frames Discarded Frames Discarded Frames 0 / 8cc 0 / 8cc 504 discardsin Pct Discards In % Discards In % 529 4 Percent 1 / 8cc 504 discards/bribet Discards Dut Discards Out 1 / 8cc 4 Percent 1 / 8cc 504 discards/bulbet Discards Out % Discards Out % 531 4 Percent 1 / 8cc 504 errors Errors Errors Errors Errors 6/8cc 0 / 8cc 504 errors Errors In % Errors In % Errors In % 530 4 Percent 1 / 8cc 504 errors/bulbet Errors Out % Errors Out % 532 4 Percent 0 / 8cc 504 errors/bulbet Errors Out % Errors Out % Errors Out % 532 4 Percent 1 / 8cc 504 frames Frames Frames 604 frames 604 frames 604 frames 604 frames 604 frames 604 frames									100.0*DELTA_TIME*DLL_RCV_OFF_FRAMES/(TR_LOST_F	
504 discarded Frames Discard	Server LAN	504 cc	oflisionsOutPct	Collisions (out) %	Collisions Out %	720	4 Percent	1%	RAME-DLL_FRAMES)	327
504 discards Discards Out Discar	Server LAN	504 di	scardedFrames	Discarded Frames	Discarded Frames	100	Zirames	0//sec	IR FRAME COPIED	श
State of the control of the contro	Server AN	504 01	Iscardsin	Discards III	Discards In	190	4 Percent	01/SEC	I Id/alvoial I IOO 1 10-5	101
504 discardsOutPct Discards Out % Discards Out % 531 4 Percent 1 % 504 discardsOutPct Discards Out % Efrors Efrors 1 % 1 % 504 errors Efrors Efrors Efrors 1 % 2 Frames 0 /sec 504 errors/Dut Efrors Out % Errors Out % 530 4 Percent 1 % 504 errors/OutPct Errors Out % Errors Out % 532 4 Percent 1 % 504 frames Frames 604 frames Frames 0 /sec 1 /sec	Server I AN	504 0	scarde Out	Discards Out	Discards Out	197	2 Frames	0/ 0	Л.	8
504 discardsOut Pct Discards Out % Discards Out % 551 4 Percent 1 % 604 errors Errors Errors Errors 17 2 Frames 0 /sec 504 errorsInPct Errors In % Errors in % Errors in % 530 4 Percent 1 % 504 errorsInPct Errors Out Errors Out 212 2 Frames 0 /sec 504 errorsOutPct Errors Out % Errors Out % 532 4 Percent 1 % 504 frames Frames Frames 1 /sec 0 /sec 0 /sec									100.0*DELTA_TIME*(TR_FRAME_COPIED-	
504 enrors Errors Errors In 504 enrors Dut Errors Out % 530 2 Frames 0 /sec 504 enrors Dut Errors Out % Errors Out % Errors Out % 532 4 Percent 1 %ec 504 frames Frames Frames 1 %ec 1 %ec	Server LAN	504 di	scardsOutPct	Discards Out %	Discards Out %	531	4 Percent	1%	DLL_COLLISIONS)/(TR_LOST_FRAME-DLL_FRAMES)	193
504 enroisin Errors in Errors in 2 Taines U/sec 504 enroisin Errors in Errors in 8, 530 4 Percent 1% 504 enroisOult Errors Out % Errors Out % 532 4 Percent 1% 504 enroisOult Errors Out % Errors Out % 532 4 Percent 1% 504 enroisOult Errors Out % Errors Out % 532 4 Percent 1% 504 errors Out % Errors Out % 532 4 Percent 1% 504 errors Out % Errors Out % 532 4 Percent 1% 505 errors Out % Errors Out % 532 4 Percent 1% 506 errors Out % Errors Out % Errors Out % 532 4 Percent 1% 507 errors Out % Errors Out % Errors Out % 532 4 Percent 1% 508 errors Out % Errors Out % Errors Out % 532 4 Percent 1% 509 errors Out % Errors Ou	Server LAN	504 er	тогѕ	Errors	Errors	-	2 Frames	oes/ 0	TR_FREQUENCY	24
504 errors.nPct Errors in % Errors out Errors Out Errors Out 1 % 504 errorsOutPct Errors Out % Errors Out % 532 4 Percent 1 % 504 frames Frames 1 % 0 /sec 0 /sec	Server LAN	504 61	rorsh	Errors In	Errors in	213	2 Frames	0 /sec	DLL ERRORS	2
504 errorsOut Errors Out % Errors Out % Errors Out % 532 4 Percent 1 % 604 frames Frames 1 2 Frames 0 /sec	Server LAN	504 er	rorsinPct	Errors In %	Errors in %	530	4 Percent	1%	TOU.U'UELIA IIME'DLL ERRORS/DLL FRAMES	192
504 errorsOutPct Errors Out % Errors Out % 532 4 Percent 1 % 604 frames Frames 1 2 Frames 0 /sec	Server LAN	204 81	Torsout	Errors Out	Eliuis Cut	717	SALIBILITY OF THE PARTY OF THE	298/10	100.0*DELTA TIME*/TR FREQUENCY.	5
504 frames Frames 1 2 Frames 0 /sec	Server LAN	504 er		Errors Out %	Errors Out %	532	4 Percent	1 %	DLL_ERRORS)/(TR_LOST_FRAME-DLL_FRAMES)	194
	Server LAN	504 fre		Frames	Frames	1	2 Frames	oes/[0	TR_LOST_FRAME	22

504 framesin 504 framesOut	Frames In Frames Out Good Polls	Frames In Frames Out	28 2	Frames	0 /sec	DILL FRAMES (TR LOST FRAME-DIL FRAMES)	- 8
504 framesOut	Frames Out Good Polls	Frames Out	58	2 Frames	0 /sec	(TR LOST FRAME:DLL FRAMES)	8
	Good Polls						82
504 apodPolls	200	Good Dolle	118	4:Dercent	- %	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	7,
504 latency	Latency	Latency	208	11 Miliseconds	1 (msec)	LATENCY	8
						(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	
504 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME	28
504 nonUnicast	Nonunicast	Nonunicast	56	2 Frames	0/sec	DLL_BCASTS	4
504 nonUnicastin	Nonunicast In	Nonunicast In	198	2 Frames	0/sec	DLL_MCASTS	3
504 nonUnicastOut	Nonunicast Out	Nonunicast Out	199	2 Frames	oes/ 0	(DLL_BCASTS-DLL_MCASTS)	84
504 reachability	Reachability	Reachability	182	10 Total Time	1(%)	(REACHABLE TIME:100 0:DELTA TIME/ITOTAL TIME:1.0))	76
						(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	
504 reboots	Reboots	Reboots	121	4 Percent	1%	OLLS+REBOOTS))*DELTA_TIME	09
504 unknownProtocolPackets	Unknown Protocol Pkts	Unkn Proto Pkts	104	2 Frames	0/sec	TR_LINE	16
600 avaifability	Availability	Availability	181	10 Total Time	11(%)	(AVAILABLE_TIME*100.0)	1
600 avgFrameSize	Average Frame Size	Avg Frame Size	700	7 Bytes	4 (bytes)	DELTA TIME TR TOKEN/TR LOST FRAME	31
600 avgFrameSizeIn	Average Frame Size In	Avg Frame Sz In	701	7 Bytes	4 (bytes)	DELTA TIME-OLL BYTES/DLL FRAMES	310
600 avgFrameSizeOut	တ	Avg Frame Sz Out	702	7 Bytes	4 (bytes)	OLL_FRAMES)	306
	ŀ	i d			- 3	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	1
600 badPolls	Bad Polls	Bad Polls	020		1 %	POLLS+REBOOTS)/DELTA_IIME	3 6
600 bandwidth	Bandwidth Utilization	BW Util	240		1%	((IR_IOKEN'8'100 0)/\$(speed lota!))	78
600 bandwidthOut	Bandwidth Hilization Out	RW 184 Ont	211	4 Percent	1 %	//CTB_TOKEN.DII RYTESI*8*100 0/%/speedOut)	2 8
600 bits	Bits	Bits	437	15 Bits	0 /sec	(TR TOKEN*80)	161
600 hitsh	Bits In	Bits In	438	15 Bits	oes/0	(DLL BYTES*8.0)	160
600 bitsOut	Bits Out	Bits Out	439	15 Bits	0 /sec	((TR_TOKEN-DLL_BYTES)*8.0)	166
600 bytes	Bytes	Bytes	2	1 Bytes		TR_TOKEN	23
600 bytesin	Bytes In	Bytes in	18	1 Bytes	oes/ ₀	DLL_BYTES	2
600 bytesOut	Bytes Out	Bytes Out	20	1 Bytes		(TR_TOKEN-DLL_BYTES)	74
600 discardedFrames	Discarded Frames	Discarded Frames	22	2 Frames		TR FRAME COPIED	129
600 discardsIn	Discards In	Discards In	196	ZiFrames	1	DIL_COLLISIONS	2
600 discardsInPct	Discards In %	Discards in %	529	4 Percent	1	100.0*DELIA_HME*DLL_COLLISIONS/DLL_FRAMES	5
600 discardsOut	Discards Out	Discards Out	187	Z Frames		400 OSDELTA TIMESTED EDAME CODEED	3
600 discardsOutPct	Discards Out %	Discards Out %	531	4 Percent	- %	DLL_COLLISIONS)/(TR_LOST_FRAME-DLL_FRAMES)	193
600 errors	Errors	Errors	7	2 Frames	oes/ 0	TR_FREQUENCY	24
600 errorsin	Errors In	Errors In	213	2 Frames	oes/ 0	DLL_ERRORS	10
600 errorsinPct	Errors In %	Errors in %	530	4 Percent	1%	100.0*DELTA_TIME*DLL_ERRORS/DLL_FRAMES	192
600 errorsOut	Errors Out	Errors Out	212	2 Frames	0 /sec	TR_FREQUENCY-DLL_ERRORS	40
t-din Carorro Con	Errors Out %	Frors Out %	532	4 Percent	,	100.0-DELIA_HMET(1K_FREQUENCY- DLL_ERRORS)/(TR_LOST_FRAME-DLL_FRAMES)	194
600 frames	Frames	Frames	-	2 Frames	0/sec	TR_LOST_FRAME	22
600 framesin	Frames In	Frames In	28	2 Frames	oes/ 0	DLL_FRAMES	
600 framesOut	Frames Out	Frames Out	29	2 Frames	0 /sec	(TR_LOST_FRAME-DLL_FRAMES)	82
	:	-11-0	07	***************************************	8	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	22
600 goodPolls	Good Polis	Good Polls	000	4 relicent	(Joseph)	I ATENCY	8
600 latency	Latency	Latency	700	I I IMIIISECOTOS	1 (11390)	/100 0*MISSED POLI S//GOOD POLI S+MISSED POLLS+B	5
600 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME	58
600 nonUnicast	Nonunicast	Nonunicast	56	2 Frатев	0 /sec	DLL_BCASTS	4
600 nonUnicastIn	Nonunicast in	Nonunicast In	198	2 Frames	0 /sec	DLL_MCASTS	0
600 nonUnicastOut	Nonunicast Out	Nonunicast Out	199	2 Frames	0/sec	(DLL_BCASTS-DLL_MCASTS)	84
ROO reachability	Reachability	Reachability	182	10 Total Time	1(%)	(REACHABLE TIME*100,0*DELTA_TIME/(TOTAL_TIME*1.0))	26
		4-	ç	0	200	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	9
- 1		Keboots	172	4 Percent	0 1 70 0 (spc	TD I INE	96
-		וחומנו בוחוס במופ	1	Z Flaines	200/12	ייאליי	
	Sizeout Sizeout Sizeout Sizeout Sizeout Cout Cout Cout Cout Cout Cout Cout C	SSize Availability SSize Availability SSize Availability SSize Availability SSize Availability Availability Availability SSize Out Bardwidth Utiliza Availability Bardwidth Utiliza Availability Bardwidth Utiliza Availability Bardwidth Utiliza Availability Bardwidth Utiliza Bardwidth	ProtocoolPackets Unknown Protocol Pkts ProtocoolPackets Unknown Protocol Pkts ProtocoolPackets Unknown Protocol Pkts ProtocoolPackets Unknown Protocol Pkts ProtocolPackets In Average Frame Size In Average Frame Size In Average Frame Size In Average Frame Size In Bad Polis Bad	Protocool Packets Director Pkts Director	Notice Protection Protect	Sizea	Control Principle Cont

[ahe]	element tree	symbol	lahot	short taket	var id unite	id lahol	tunite time tout	[44] Attended Attended	
Modem	700 availability	availability	Availability	Availability	181 10 Total	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	2 12
Modem	700	700 badPolls	Bad Polls	Bad Polls	120	4 Percent	*	(400.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS))*DELTA_TIME	29
Модет	JOZ	700 bandwidth	Bandwidth I thiization	BW Lttl	209	4 Percent	200	100.0"((DLL_TRANSITS+DLL_ENET_FRAMES)"9.0"DELTA_ TIME/DLL_BYTES)/((TR_SET_RECOVERY_MODE+DLL_AL GN_FRRORS)/DELTA_TIME\	124
Modem	202	700 bandwidthin	Bandwidth Hillization In	BW Util to	210	4 Percent	***	100.0*(DLL_ENET_FRAMES*8.0*DELTA_TIME/DLL_BYTES)/ /TR SET RECOVERY MODE/DELTA_TIME:	_
Modem	202	700 bandwidthOut	Bandwidth Utilization Out	aw Hid Out	244	4 Percent		100.0°(DLL_TRANSITS*8.0°DELTA_TIME/DLL_BYTES)/(DLL	1_
Модет	700	700 bits	Bits	Bits	437	15 Bits		((OLL TRANSITS+DLL ENET FRAMES)*8 0)	163
Modem	700	700 bitsIn	Bits In	Bits In	438	15 Bits	o /sec	(DLL_ENET_FRAMES*8.0)	165
Modem	700	700 bitsInPerCallSecond	Bits In Per Call Second	Bits In/Call Sec	402	13 Gauge	1	DLL_ENET_FRAMES'8.0'DELTA_TIME/DLL_BYTES	122
Modem	700	700 bitsOut	Bits Out	Bits Out	439	15 Bits	oes/ 0	(DLL_TRANSITS*8.0)	168
Modem	700	700 bitsOutPerCallSecond	Bits Out Per Call Second	Bts Out/Call Sec	403	13 Gauge	-	DLL_TRANSITS*8.0*DELTA_TIME/DLL_BYTES	123
Modem	202	700 bitsPerCaliSecond	Bits Per Call Second	Rits/Call Sec	401	13)Garide	Ţ	{{DLL_TRANSITS+DLL_ENET_FRAMES}*8.0*DELTA_TIME/D I RYTES	
Modern	707	700 busyTime		Busied Out	378	4 Percent	1 %	100.0*TR FRAME COPIED	108
Modern	202	700 bytes	Bytes	Bytes	2	1 Bytes	0 /sec	DIL TRANSITS+DLL ENET FRAMES	31
Modem	700	700 bytesin	Bytes In	Bytes In	18	1 Bytes	0 /sec	DLL ENET FRAMES	8
Modem	202	700 bytesOut	Bytes Out	Bytes Out	20	1 Bytes	0 //sec	DLL_TRANSITS	7
Modem	700	700 caliRcvRate	Speed in	Speed In	324	0 Rate	oes/ 0	TR_SET_RECOVERY_MODE	12
Modem	700	700 call XmitRate	Speed Out	Speed Out	323	0 Rate	0 /sec	DLL_ALGN_ERRORS	11
Modem	700	700 connectErrors	Connect Errors	Connect Errors	314	0 Rate	0 /sec	DLL_MCASTS	3
Modem	700	700 connections	Connections	Connections	317	0 Rate	0/sec	TR_LINE	16
Modem	2002	700 connectTime	Connect Time	Connect Time	320	4 Percent	1 %	100.0⁺TR_ABORT	5
Modem	700	700 disabledTime	Disabled Time	Disabled Time	321	4 Percent	1 %	100.0⁺TR_ADDRESS_COPIED	106
Modern	700	700 discardedFrames	Frames Discarded	Frames Discarded	56	2 Frames	0 /sec	DLL_COLLISIONS	6
Modem	200	discardedFramesPct	Frames Discarded %	Frames Oscrded %	705	4 Percent	*	100.0*DELTA_TIME*DLL_COLLISIONS/(TR_BIT_STREAMIN G+TR_CONTENTION_STREAMING)	301
Modem	2007	700 frameErrors		Frame Errors	315	2 Frames	0//880	DLL ERRORS	10
Modem	002	700 frame Errors Pot	Frame Errors %	Frame Errors %	704	4 Percent	%	100.0*DELTA_TIME*DLL_ERRORS/(TR_BIT_STREAMING+TR CONTENTION STREAMING)	302
Modem	2007	700 frames	Frames	Frames	-	2 Frames	ol/sec	TR BIT STREAMING+TR CONTENTION STREAMING	97
Modem	2007	700 framesin	Frames In	Frames In	28	2 Frames	Jes/ O	TR BIT STREAMING	14
Modern	2007	700 framesOut	Frames Out	Frames Out	23	2 Frames	0//86	TR_CONTENTION_STREAMING	15
								(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	
Modern	200	700 goodPolls	Good Polls	Good Polls	118	4 Percent	1 %	D_POLLS+REBOOTS))*DELTA_TIME	5/
Modem	200	latency	Latency	Latericy	700	spilisecolins	(nasar)	(100 0*MISSED POLLS//GOOD POLLS+MISSED POLLS+B	
Modem	700	700 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME	58
					~			100.0'(TR_INTERNAL+TR_ABORT+TR_ADDRESS_COPIED +TR_CONGESTION+TR_FRAME_COPIED+TR_LLC_FRAME	
Modem	200	700 modemBusyTime	Modern Busy Time	Modern Busy Time	395	4 Percent	1%	(S)	118
Modern	2004	700 modemErrors	Modern Errors	Modem Errors	351	0 Rate	oes/ 0	DLL_MCASTS+DLL_XMT_OFF_FRAMES	102
Modern	002	offhookTime	Off Hook Time	Off Hook Time	319	4 Percent	1%	100.0*TR_INTERNAL	104
Modem	700	onhookTime	On Hook Time	On Hook Time	318	4 Percent	1%	100 O'TR_BURST	2
Modem	700	700 other Errors	Other Errors	Other Errors	352	0 Rate	oes/ 0	DLL_XMT_OFF_FRAMES	9
	-	700 receiptability	Donothakility	Reachability	182	10 Total Time	1 (%)	(REACHABLE TIME*100.0*DELTA TIME/(TOTAL TIME*1.0))	192
Modern	200	lead rability	Neachaonny	(all all all all all all all all all all				(100.0*REBOOTS//GOOD POLLS+MISSED POLLS+BAD P	L
Modem	700	700 reboots	Reboots	Reboots	121	4 Percent	1 %		09
Modem	200	700 retrains	Retrains	Retrains	316	12 Per Call Minute	1 (/Call Min)		104
Модет	700	700 testTime	Test Time	Test Time	379	4 Percent	1 %	100 0*TR_LLC_FRAMES	103
Modem	200	unknownTime	Unknown Time	Unknown Time	322	4 Percent	%	100.0*1R CONGESTION	10
ISDN Interface	701	701 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE TIME-100.0)	`
ODN introfess	, , , , , , , , , , , , , , , , , , ,	704 hodbolle	alto Dotte	Bad Dolls	120	4 Percent	***************************************	(100.0 BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS))*DELTA_TIME	29
ioni menace		Daurons	Cau - Cais	Cita Cita	25.				

lahel	alament fune combol	lahel	short label	var id luni	var id lunits id label	units type text		col_id
lanel	element type symbol	ignes.		2			100.0*((DLL_TRANSITS+DLL_ENET_FRAMES)*8.0*DELTA_	
ISDN Interface	701 bandwidth	Bandwidth Utilization	BW Util	508	4 Percent	1%	TIME/DLL_BYTES)/((TR_SET_RECOVERY_MODE+DLL_AL GN_ERRORS)/DELTA_TIME)	124
Solveto NOSI	701 bandwidthla	Bandwidth I thization in	o H	210	4 Percent	**	100.0*(DLL_ENET_FRAMES*8.0*DELTA_TIME/DLL_BYTES)/	125
	THE PART OF THE PA		- C - W - W - C - C - C - C - C - C - C	-	100000	70 1	100.0*(DLL_TRANSITS*8.0*DELTA_TIME/DLL_BYTES)/(DLL	126
ISDN Interface	701 bandwidthOut	Bandwidth Utilization Cut	Bute	437	45 Bits	0/ - U	(ID) TRANSITS+DI ENET FRAMES)*8.0)	163
ISDN Interface		Bits in	Bits In	438	15 Bits	0//sec	(DLL ENET FRAMES'8.0)	165
ISDN Interface		Bits In Per Call Second	Bits In/Call Sec	402	13 Gauge	-	DILL_ENET_FRAMES*8.0*DELTA_TIME/DILL_BYTES	122
ISDN Interface	701 bitsOut	Bits Out	Bits Out	439	15 Bits	0 //sec	(DLL_TRANSITS*8 0)	168
ISDN Interface		Bits Out Per Call Second	Bts Out/Call Sec	403	13 Gauge	1	DLL_TRANSITS*8.0*DELTA_TIME/DLL_BYTES	123
			; ;		0,	,	(DLL_TRANSITS+DLL_ENET_FRAMES)*8.0*DELTA_TIME/D	ç
ISDN Interface		Bits Per Call Second	Bits/Call Sec	401	13 Gauge		AND ANTE CONTRACT CONTRACT	7 00
ISDN Interface	701 busyTime	Busied Out Time	Busied Out	3/8	4 Percent	% .	100.0°1K_FRAME_COPIED	5 6
ISDN Interface	701 bytes	Bytes	Bytes	7	1 Bytes	01/860	DEL TANSITOTONIA	200
ISDN Interface		Bytes In	Bytes In	2 2	1 Bytes	0//380	INI TOANSITS	7
ISDN Interface	701 bytesOut	Bytes Out	Bytes Out	02/20	Dates	0 /860	TE SET RECOVERY MODE	- 2
ISON Interface	701 Call Collection	Speed In	Speed in	322	OBate	200/	DI ALGN FREDRS	÷
ISDN Interface	701 call Xmitkate	Speed Out	Consect France	314	O Rate	0.786	DI MCASTS	3
SON menace	704 20111013	Competions	Connections	317	ORate	oes/ 0	TR LINE	16
SOLVE LANGE		Compost Time	Connect Time	320	4 Percent	1 %	100 0*TR ABORT	105
SDN menace	701 disabled inte	Disabled Time	Disabled Time	324	4 Percent	1 %	100.0*TR ADDRESS COPIED	106
ISOM Interface	704 decarded Frames	Framos Discarded	Frames Discarded	26	2 Frames	oes/ 0	DLL COLLISIONS	တ
			/o Proposition 1	706	1 Darront	2,	100.0*DELTA_TIME*DLL_COLLISIONS/(TR_BIT_STREAMIN G+TR_CONTENTION_STREAMING)	304
ISDN Interface	701 discarded Frames Pct	Frames Discarded %	Frames Decreed %	100	T L L L L L L L L L L L L L L L L L L L	0000	Dil EDDODG	-
ISDN Interface	701 frameErrors	Frame Errors	Frame Errors	STS.	Zirrames	DAS/O	100.0*DELTA TIME*DLL ERRORS/(TR BIT STREAMING*T	2
ISDN Interface	701 frameErrorsPct	Frame Errors %	Frame Errors %	704	4 Percent	1 %	R_CONTENTION_STREAMING)	302
ISOM Interface		Frames	Frames	-	2 Frames	oes/I0	TR_BIT_STREAMING+TR_CONTENTION_STREAMING	97
ISDN Interface	701 framesin	Frames In	Frames In	28	2 Frames	0//sec	TR_BIT_STREAMING	14
ISDN Interface	701 framesOut	Frames Out	Frames Out	29	2 Frames	0 //sec	TR_CONTENTION_STREAMING	15
Daniel Line	ollogians 10t	Dolle	Sport Polls	118	4 Percent	18	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA D POLLS+REBOOTS))*DELTA_TIME	57
ISUN Interface	101 good Folls	Good Tolls	l atendo	208	11 Milisaconds	1 (msec)	LATENCY	L
ISUN Interface	/Uillatency	Laterity	Lacon Dolla	1 07	4 Derrent	1 %	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	28
ISDN Interface	701 missedPolts	Missed Polis	MISSED LOUIS	2	1000		100.0°(TR_INTERNAL+TR_ABORT+TR_ADDRESS_COPIED	
		1	i	Ç	- C	70	+TR_CONGESTION+TR_FRAME_COPIED+TR_LLC_FRAME	118
ISDN Interface	701 modemBusyTime	Modem Busy Time	Modem Busy Itme	351	0 Rate	0//sec	DLL_MCASTS+DLL_XMT_OFF_FRAMES	102
ISDIN Interrace	704 official Timo	Off Hook Time	Off Hook Time	319	4 Percent	1 %	100.0*TR_INTERNAL	5
ISDIN Interface	701 Onbook Time	On Hook Time	On Hook Time	318	4 Percent	1 %	100.0*TR_BURST	<u>ş</u>
ISDN Interface	701 otherErrors	Other Errors	Other Errors	352	0 Rate	o /sec	DLL_XMT_OFF_FRAMES	٥
oografie NOO	704 resorbability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	76
SOLVE MINES	Sample of the sa			3	4	à	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P)	09
ISDN Interface		Reboots	Reboots	127	4 Percent	2 7	100 0*TR 11C FRAMES	109
ISDN Interface	701 testTime	Test Time	1 february Time	322		1 1%	100.0*TR CONGESTION	107
ISDN Interface	701 unknownTime	Onknown Lime	Availability	184	10 Total Time	1(%)	(AVAILABLE_TIME*100.0)	77
Remote Access Server	/25 availability	Ovaliability .					(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
Remote Access Server	725 badPolls	Bad Polls	Bad Polls	120	4 Percent	1%	POLLS+REBOOTS))*DELTA_TIME	193
Remote Access Server	725 bits	Bits	Bits	437	15 Bits	208/0	(OLL TRANSITS+ULL ENET_FRANCS) 8:3)	165
Remote Access Server	725 bitsin	Bits In	Bits in	438	15 Bits	1 0/380	IN ENET FRAMES'8 0'DELTA TIME/DLL BYTES	122
Remote Access Server	725 bitsInPerCallSecond	Bits in Per Call Second	Bite Out	439	15 Bits	0 /sec	(DLL_TRANSITS*8.0)	168
Remote Access Server	725 bitsOut	Bits Out Bar Call Second	Bts Out/Call Sec	403	13 Gauge	-	DLL TRANSITS*8.0*DELTA_TIME/DLL_BYTES	123
Remote Access Server	/ZSIDIISOUIPBroaiconu	DIS Out ret out second	200 000 000	22.	-6(2)			

label	element type symbol	symbol	label	short_label	var id units	units id label	units type text	col expression	pj log
Remote Access Server	725	725 bitsPerCallSecond	Bits Per Call Second	Bits/Call Sec		13 Gauge	_	+DLL_ENET_FRAMES)*8.0*DELTA_TIME/D	121
Domote Arrest Contor				0	8		-		
Remote Access Server	202	725 http://	KAS Busied Out Time	HAS BUSIEG OUT	293	4 Percent	% .	100.0°TR_FRAME_COPIED*DELTA_TIME/TR_LOST_FRAME	115
Remote Access Server	102	725 hytesin	Aytes In	Bytes In	7 8	1 Bytes	oes/n	DLL TRANSILSTOLL ENEL FRAMES	31
Remote Access Server	725	hytesOut	Bytes Out	Bytes Out	2 00	1 Bytes	200/0	DEL CACITACINES	10
Remote Access Server	725	725 connectErrors	Connect Errors	Connect Errors	314	OlRate	200/0	DIL MORTS	7
Remote Access Server	726	connections	Connections	Connections	317	OBate	200,0	TD - INF	3 5
Remote Access Server	725	725 connectTime	RAS Connect Time	RAS Connect Time	390	4 Percent	1 0	400 0'TD ABOBTODE TA THEFTED 1001 FDANK	91
Remote Access Server	725	725 cpuUtilization	CPU Utilization	CPU Utilization	91	4 Percent	7 %	DI BOASTS	71.1
								100.0*TR_ADDRESS_COPIED*DELTA_TIME/TR_LOST_FRA	4
Remote Access Server	725	725 disabled Time	RAS Disabled Time	RAS Dsbld Time	391	4 Percent	1 %	ME	113
Nelligie Access Server	(22)	discardedFrames	Frames Discarded	Frames Discarded	26	2 Frames	os/ 0	DLL_COLLISIONS	6
Remote Access Server	725	discardedFramesPct	Frames Discarded %	Frames Dscrded %	705	4 Percent	%	100.0*DELTA_TIME*DLL_COLLISIONS/(TR_BIT_STREAMIN) C+TB_CONTENTION_STDEAMING)	200
Remote Access Server	725	725 frameErrors	Frame Errors	Frame Errors	315	2 Frames	0/sec	DIL ERRORS	5
Domoto Arrango	ř	-		1				100.0*DELTA_TIME*DLL_ERRORS/(TR_BIT_STREAMING+T	
Demote Access Server	67)	7.23 IrameErrorsPct	Frame Errors %	Frame Errors %	704		1%	R_CONTENTION_STREAMING)	302
Pemote Access Seliver	07/	725 frames	Frames	Frames	-	2 Frames	0 /sec	TR_BIT_STREAMING+TR_CONTENTION_STREAMING	97
Remote Access Server	777	725 frameoOut	Frames In	rames in	87 53	2 Frames	0 //8ec	TR_BIT_STREAMING	14
	(2)	II di li con la contra la	rigines out	rrames out	67	2 rrames	0 //sec	TR_CONTENTION_STREAMING	15
Remote Access Server	725	725 goodPolls	Good Polls	Good Polls	118	4 Percent	8	(100.0-GOOD_POLLS/GOOD_POLLS+MISSED_POLLS+BA	7
Remote Access Server	725	latency	Latency	Latency	208		11(msec)	ATENCY	òò
Remote Access Server	725	725 memory	Memory	Memory	376	7 Bytes	4 (bytes)		12
Remote Access Server	725	725 memoryFree	Memory Free	Memory Free	706	7 Bytes	4 (bytes)	T	304
Remote Access Server	725	memoryUsed	Memory Used	Memory Used	375	7 Bytes	4 (bytes)	DLL_ALGN ERRORS	1
Remote Access Server	367	705 memoral thirotton	Months Williams	111111111111111111111111111111111111111	760			100.0*DELTA_TIME*DLL_ALGN_ERRORS/TR_SET_RECOV	1
DA 100 85000 00000	(2)	men or youngation	Memory Unizavon	Methory Cill	901	4 Percent ·	%	ERY_MODE	66
Remote Access Server	725	725 missedPolls	Missed Polls	Missed Polls	119	4 Percent	-	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD POLLS+REBOOTS))*DELTA TIME	28
		i.						100.0*(TR_INTERNAL+TR_ABORT+TR_ADDRESS_COPIED	
		i		:				+TR_CONGESTION+TR_FRAME_COPIED+TR_LLC_FRAME	
Remote Access Server	1/25	725 modemBusyTime	Modern Busy Time	Modem Busy Time	395	4 Percent		S)*DELTA_TIME/TR_LOST_FRAME	117
Remote Acress Serior	267	725 modernerrors	Modern Errors	Modern Errors	306	U Kate	n/sec	DLL_MCASIS+DLL_XMI_OFF_FRAMES	102
Remote Access Server	201	725 modemeBirer	Moderne Buey	Moderne Bliev	307	10 Size	7	TO TOKEN	2 66
Remote Access Server	725	725 modemsBusyPct	Percent Modems Busy	Prd Moderns Busy	377	4 Percent	, ,	100 0*DELTA TIME*TR TOKENTR ERECLIENCY	3 8
Remote Access Server	725	725 offhookTime	RAS Off Hook Time	RAS Off Hk Time	389	4 Percent	1 %	100.0*TR INTERNAL*DELTA TIME/TR LOST FRAME	Ξ
Remote Access Server	725	onhookTime	RAS On Hook Time	RAS On Hk Time	388	4 Percent	1%	100.0*TR_BURST*DELTA_TIME/TR_LOST_FRAME	110
Remote Access Server	725	725 otherErrors	Other Errors	Other Errors	352	0 Rate	0 /sec	DLL_XMT_OFF_FRAMES	9
Remote Acress Server	795	795 reachability	Doarhabith	Reachability	182	10 Total Time	1/%)	(REACHABLE TIME*100 0*DELTA TIME//TOTAL TIME*1 0))	76
			,					(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	2
Remote Access Server	725	reboots	Reboots	Reboots	121	4 Percent	1 1%	\neg	9
Remote Access Server	725	retrains	Retrains	Retrains	316	12 Per Call Minute	등	Min) TR_SIGNAL_LOSS*60.0*DELTA_TIME/DLL_BYTES	101
Remote Access Server	725	725 testTime	١.	RAS Test Time	394		%:	100.0°TR_LLC_FRAMES*DELTA_TIME/TR_LOST_FRAME	116
Remote Access Server	725	unknownTrme	RAS Unknown Time	KAS Unknown Time	392	4 Percent	1%	100.0*TR_CONGESTION*DELTA_TIME/TR_LOST_FRAME	114
RAS CPU	750	hadPolls	Bad Polls	Bad Polls	120	4 Percent	*	(100.0"BAD_POLLS(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS)\foliage TA TIME	29
RAS CPU	750	750 cpuUtilization	CPU Utilization	CPU Utilization	94	4 Percent	1 %	DLL_BCASTS	4
1100 340	750	750 250	Sout Della	alog pole	270	A Demont		(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	7,
	00.	Silo Looo			2			(100.0*MISSED_POLLS/GOOD_POLLS+MISSED_POLLS+B	5
RAS CPU	750	750 missedPolls	Missed Polls	Missed Polis	119	4 Percent	%	AD_POLLS+REBOOTS))*DELTA_TIME	28
RASCPU	750	750 rebnots	Reboots	Reboots	121	4 Percent		(100.0 REBOOTS)(GOOD_POLLS+WISSED_FOLLS+BAD_F)	09
		20000							

			11.1.1.1	shad lakel	latel id limits id lishel		unite tune text	col expression	col id
label	element_type symbol	symbol	lacet	SHOIL IADEL	2			LLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
Modem Pool	775 b	775 badPolis	Bad Polls	Bad Polts	120	4 Percent	1 %	POLLS+REBOOTS))*DELTA_TIME	200
Modem Pool	775 t	oits	Bits	Bits	437	15 Bits	oes/o	((DLL_TKANSITS+DLL_ENEL_FKAMES)'8.0)	201
Modem Pool	1922	775 bitsin	Bits In	Bits tn	438	15 Bits	0 /sec	(DLL_ENE!_FKAMES'8.0)	2 5
Modem Pool	175	oitsInPerCallSecond	Bits in Per Call Second	Bits In/Call Sec	402	13 Gauge		OLL ENET FRAMES 8.0 DELIA HME/ULL BY LES	77,
Modern Pool	775	775 bitsOut	Bits Out	Bits Out/Call Sec	439	13 Galine	1	DELL TRANSITS 8.0° DELTA TIME/DEL BYTES	123
MODELL FOOL	100	olisodir el calloacorio	Die Col Lei Cel					(DLL_TRANSITS+DLL_ENET_FRAMES)*8.0*DELTA_TIME/D	3
Modem Pool	775	775 bitsPerCaliSecond	Bits Per Call Second	Bits/Call Sec	401	13 Gauge	-	LL_BYTES	121
Modem Pool	1277	775 husyTime	Poof Busted Out Time	Pool Busied Out	386	4 Percent	1 %	100.0*TR_FRAME_COPIED*DELTA_TIME/TR_LOST_FRAME	115
Modem Pool	775	775 hytes		Bytes	2	1 Bytes	ol/sec	DLL_TRANSITS+DLL_ENET_FRAMES	31
Modem Pool	7751	775 bytesin	Bytes In	Bytes in	18	1 Bytes	oes/ 0	DLL_ENET_FRAMES	8
Modem Pool	775	775 bytesOut	Bytes Out	Bytes Out	20	1 Bytes	oes/ 0	DLL_TRANSITS	7
Modem Pool	775	connectErrors	Connect Errors	Connect Errors	314	0 Rate	o /sec	DLL_MCASTS	m
Modem Pool	775	connections	Connections	Connections	317	0 Rate	o /sec	TR_LINE	16
Modern Pool	775	775 connectTime	Pool Connect Time	Pool Conn Time	383	4 Percent	1 %	100.0*TR_ABORT*DELTA_TIME/TR_LOST_FRAME	112
	ļ		F 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Contraction of the Contraction o	700	A Domona	8	100.0*TR_ADDRESS_COPIED*DELTA_TIME/TR_LOS1_FRA	113
Modem Pool	775	775 disabled lime	Fool Disabled Time	Frames Discarded	28	2 Frames		DIL COLLISIONS	6
MODELLI LOOI	0001	uscardeorranies	rialies Discarded	Capital Calling	3			100 0*DELTA_TIME*DLL_COLLISIONS/(TR_BIT_STREAMIN	
Modem Pool	775	discardedFramesPct	Frames Discarded %	Frames Dscrded %	705	4 Percent	1 %	G+TR_CONTENTION_STREAMING)	301
Modem Pool	775	775 frameErrors	Frame Errors	Frame Errors	315	2 Frames	oes/ 0	DLL_ERRORS	우
								100 0*DELTA_TIME*DLL_ERRORS/(TR_BIT_STREAMING+T	000
Modem Pool	775 ft	775 frameErrorsPct	Frame Errors %	Frame Errors %	704	4 Percent	1%	R CONIENTION STREAMING)	202
Modem Pool	775	rames	Frames	Frames	-	Zirrames	oes/In	THE BIT OF STREETING THE CONTENTION STREETING	100
Modem Pool	775 ft	775 framesIn	Frames In	Frames In	87 6	Zirames	O /sec	TO CONTENTION STORAMING	40
Modem Pool	775	ramesOut	Frames Out	Frames Out	87	ZILIBILIES	0//260	ANSED POLISHMENT POLISHMENT POLISH	
0.00	- 125		0000 POO	Good Polls	118	4 Percent	7	D POLLS+REBOOTS))*DELTA_TIME	22
Modern 700	50//	775 goodPoils	9000 0000	200				(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	
Modem Pool	775	775 missedPolls	Missed Polls	Missed Polls	119	4 Percent	1 %	AD_POLLS+REBOOTS))*DELTA_TIME	28
								100.0*(TR_INTERNAL+TR_ABORT+TR_ADDRESS_COPIED	
-		1	i	1	i c	100000	76	*IN_CONGENTION*IN_TRAME_CONED*IN_LLC.TRAME_	117
Modem Pool	775	775 modernBusyTime	Modem Busy I me	Modern Busy IIII	254	open o	Jes/ O	DI MCASTS+DII XMT OFF FRAMES	102
Modern Pool	77510	775 modemErrors	Modern Errors	Modern Errors	900	10 8:20		TO FRECIENCY	24
Modem Pool	7751	775 moderns	Number of Modems	Moderns Briev	367	19 Size	4	TR TOKEN	23
Modem Pool	1(5)	//SimodemsBusy	Moderns busy	Det Moderne Buey	377		1 %	100.0 DELTA TIME TOKEN/TR FREQUENCY	98
Modem Pool	1/5/	775 modemsbusyPct	Percent Moderns Busy	Pool Off Hk Time	382	4 Percent	1%	100.0 TR_INTERNAL DELTA_TIME/TR_LOST_FRAME	11
Industrial Property	277	775 cohootTimo	Pool On Hook Time	Pool On Hk Time	381	4 Percent	1 %	100.0*TR_BURST*DELTA_TIME/TR_LOST_FRAME	130
Modem Pool	775	775 Other Errore	Other Fronts	Other Errors	352		oes/ 0	DLL_XMT_OFF_FRAMES	9
ion line								(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	ç
Modem Poot	775	eboots	Reboots	Reboots	121		1%	OLLS+REBOOTS))*DELTA_IIME	100
Modem Pool	775	775 retrains	Retrains	Retrains	316	12 Per Call Minute	1 (Call Mill)	100 0:TB 11 C EDANGE - DEL TA TIME/TR 10ST FRAME	116
Modem Pool	775 t	775 testTime	Pool Test Time	Pool Test Time	387	4 Percent	% %	100 0'TR CONGESTION'DELTA TIME/TR LOST_FRAME	114
Modern Pool	7750	775 unknownTime	Pool Unknown Time	Attornote	467	13 Gairde	-	(DLL BCASTS)	173
Response Path	8008	attempts	Attempts	Service Avail	498	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	1
Response Path	8008	800 availability	Service Availability	Ava Reen Time	440	11 Milliseconds	1 (msec)	((LATENCY/DLL_RCV_OFF_FRAMES)*DELTA_TIME)	172
Response Path	8008	avgresp i me	Avg. Aesponse IIIIe	and and a	-			(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	1
Boenonee Path	4008	Polls	Bad Polls	Bad Polls	120	4 Percent		POLLS+REBOOTS))*DELTA_TIME	18
Response Path	800	800 bytestn	Bytes In	Bytes In	18	1 Bytes	0/800	DLL_TRANSITS	182
Response Path	800	800 bytesOut	Bytes Out	Bytes Out	ଷ୍ଟ	1 Bytes	0/860	(DEL_XMI_OFF_FRAMES-ULL_IRANSIIS)	1
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Follod Attempts	469	4 Percent	%	(TUC ((DLL_BCASTS - DLL_BCASTS)*DELTA_TIME)	175
Response Path	800#	800 failedAffempts	Falled Attempts	I mit	474	11 Miliseconds	1 (msec)	(\$(speed)*DELTA_TIME)	184
Response Path	800 809	joal	Cimit					(100.0°GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	- 1
Response Path	800	800 goodPolls	Good Polis	Good Polls	118	4 Percent	1 %	D_POLLS+REBOOTS))*DELTA_TIME	26

label	element type symbol	label	short label	var id units	id label	units type text	col expression	00
Response Path	800 maxResponse	Maximum Response	Max Response	443	Max Milliseconds	3 (msec)		
	800 minResponse	Minimum Response	Min Response	442	16 Min Milliseconds	2 (msec)	DLL_FRAMES	
Response Path	800 missedPolls	Missed Polls	Missed Polls	119	4 Percent	-1%	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME	88
Response Path	800 reboots	Reboots	Reboots	121	4 Percent	1 %	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+REBOOTS))*DELTA_TIME	8
Response Path	800 response VsGoal	Response/Limit	Response/Limit	453	4 Percent	- 7-	(100°(LATENCY/(\$(speed)'DLL_RCV_OFF_FRAMES))'DELT A_TIME)	185
Response Path	800 successful Attempts	Successful Attempts	Successful Att	468	4 Dorroom	2	(100*(DLL_RCV_OFF_FRAMES/DLL_BCASTS)*DELTA_TIME	
Response Path w/ Jitter	801 attempts	Attempts	Attempts	467	13 Gaine	7,0	(DI BOARTS)	1/4
Response Path w/ Jitter	801 availability	Service Availability	Service Avail	498	10 Total Time	1 (%)	(AVAILABLE TIME*100.0)	
Response Path w/ Jitter	801 avgRespTime	Avg. Response Time	Avg Resp Time	440	11 Milliseconds	1 (msec)	((LATENCY/DLL_RCV_OFF_FRAMES)*DELTA_TIME)	172
Response Path w/ Jitter	801 hadPolls	Sad Dolle	Bod Dolle	120	A Dorocut	8	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
Response Path w/ Jitter	801 bytesin	Bytes In	Bytes In	18		0/ 1	POLLS+REBOOLS) DELIA LIME	7 2
Response Path w/ Jitter	801 bytesOut	Bytes Out	Bytes Out	20	1 Bytes	0/sec	(DLL_XMT_OFF_FRAMES-DLL_TRANSITS)	182
Response Path w/ Jitter	801 failedAttempts	Failed Attempts	Failed Attempts	469	4 Percent		(100*((DLL_BCASTS - DLL RCV OFF FRAMES)/DLL RCV OFF FRAMES)/DLL RCV OFF FRAMES)	175
Response Path w/ Jitter	801 goal	Limit	Limit	474	11 Milliseconds	1 (msec)	(\$(speed)*DELTA_TIME)	184
Response Path w/ Jitter	801 goodPolls	Good Polls	Good Polls	118	4 Percent	1 %	(100.0*GOOD_POLLS/RGOOD_POLLS+MISSED_POLLS+BA D_POLLS+REBOOTS))*DELTA_TIME	57
Response Path w/ Jitter	801 jitter	Jitter	Jitter	455	11 Milliseconds	1 (msec)	((DLL_ERRORS+DLL_ENET_FRAMES)*DELTA_TIME/(TR_A DDRESS_COPIED+TR_TOKEN))	188
Response Path w/ Jitter	801 jitterin	Jitter In	Jitter In	476	11 Milliseconds	1 (msec)	(DLL_ERRORS*DELTA_TIME/TR_TOKEN)	187
Response Path w/ Jitter	801 iiitlerDiit	tu O retiff.	Juffer Out	475	11 Millseconds	1 (msec)	(DLL_ENET_FRAMES*DELTA_TIME/TR_ADDRESS_COPIED	186
Response Path w/ Jitter	801 maxResponse	Maximum Response	Max Response	443		3 (msec)	DLL_BYTES	2
Response Path w/ Jitter	801 minResponse	Minimum Response	Min Response	442	16 Min Milliseconds	2 (msec)	DLL_FRAMES	Ī
Response Path w/ Jitter	801 missedPolls	Missed Polls	Missed Polls	119	4 Percent	- %	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME	58
Response Path w/ Jitter	801 negativeJitter	Negative Jitter	Negative Jitter	478	11 Milliseconds	1 (msec)	((DLL_COLLISIONS+DLL_ALGN_ERRORS)*DELTA_TIME/(T R_ADDRESS_COPIED+TR_TOKEN))	190
Resnonse Path w/ .itter	801 positiva litter	Positive Jitter	Positive Jitter	477	11 Millseconds	1 (msec)	(((DLL_ERRORS)- DLL_ALGN_ERRORS)+(DLL_ENET_FRAMES- DLL_COLLISIONS))*DELTA_TIME(TR_ADDRESS_COPIED+ TR_TOKEN)	189
Response Path w/ .litter	801 rehoots	Rehoots	Reboots	121	4 Percent	%	(100.0*REBÓOTS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+REBOOTS))*DELTA TIME	99
Response Dath w/ litter	801 responsed/eGnal	Resource/I mit	Response/Limit	453	4 Percent	%	(100°(LATENCY/(\$(speed)*DLL_RCV_OFF_FRAMES))*DELT A TIME)	185
	100000000000000000000000000000000000000		State of the state	760	1 Domont	3	(100*(DLL_RCV_OFF_FRAMES/DLL_BCASTS)*DELTA_TIME	174
Application Response Path	802 attempts	Attempts	Attempts	467	13 Gauge		(DLL_BCASTS)	173
Application Response Path	802 availability	Service Availability	Service Avail	498	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	12
opplication Response Path	802 avgRespTime	Avg. Response Time	Avg Resp Time	440	11 Milliseconds	1 (msec)	((LATENCY/DLL_RCV_OFF_HRAMES)*UELIA_IIME) (100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	7/1
Application Response Path	802 badPolls	Bad Polls	Bad Polls	120	4 Percent	1 %	POLLS+REBOOTS))*DELTA_TIME	59
Application Response Path	802 bytesin	Bytes In	Bytes In	18	1 Bytes		DLL_TRANSITS	-
Application Response Path	802 bytesOut	Bytes Out	Bytes Out	20		0 /sec	(DLL_XMT_OFF_FRAMES-DLL_TRANSITS) (100*((DLL_BCASTS -	182
Application Response Path	802 failedAttempts	Failed Attempts	Failed Attempts	469	4 Percent	1 %	ULL RCV OFF FRAMES)/ULL BCASIS/ DELIA 11ME)	184
Application Response Path	802 goodPolls	Good Polls	Good Polls	118		1 %	(100.0°GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_POLLS+BA_TIME	57
pplication Response Path	802 maxResponse	Maximum Response	Max Response	443	17 Max Milliseconds	3 (msec)	DLL_BYTES	2
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80.0 Selection of the control of the contro	FirstSense Response Path	803 bytesOut	Bytes Out	Bytes Out	70	1 Bytes	o /sec	(DLL_XMT_OFF_FRAMES-DLL_TRANSITS)	182
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Empire Service Response Path		805 successfulAttempts	Successful Attempts	Successful Att	468	4 Percent	7 %	(100*(DLL_RCV_OFF_FRAMES/DLL_BCASTS)*DELTA_TIME)	174
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System Partition	3000	3000 good filisation	Good Polis	Good Polls	581	4 Percent	8 8	D_POLLS+REBOOLS)/ DELIA_IIME	ò [
System Partition	3000	3000 latency	Latency	Latency	208		1 (msec)	LATENCY	84
a d							1	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	5
System Parallon	2000	3000 missedPolis	Missed Polls	Missed Polis	81.5	4 Percent	%	AD_POLES+REBOOLS))*DELIA_IIME	200
System Partition	3000	3000 partitionAllocationFailures	Partition Allocation Failures	Part Alloc Falls	13/	Sirer Second	- 0	PACKELS IN	77
System Partition	0008	3000 Bartiton Reads	Partition Reads	Part Reads	104	O Rate	n /sec	DYTES IN	2 6
System Painton	2000	SOUCH Particon Read Synties	Partition Readsovvilles	Part Readsovers	120	7 Pides	Ol/sec	TO EBECHENCY	8 8
System Dodition	0006	2000 partition Stones Capacity	Partition Storage Capacity	Part Stor Eroo	504	7 Bytes	4 (Dy(es)	(TE EDECLIENCY TO EDAME CODIED)	218
System randon	2000	parmonageriee	Parition Storage rice	Dort Stor Hood	767	7 Dyles	4 (0)(69)	TO BOAME CORED	2 2
System Paranon	9000	sour parinonsionageosed	Partition Storage Used	rati stor used	2	Dytes			3
System Partition	3000	3000 partition Utilization	Partition Utilization	Part Util	153	4 Percent	1%	100.0*DELTA_TIME*TR_FRAME_COPIED/TR_FREQUENCY	62
System Partition	3000	3000 partitionWntes	Partition Writes	Part Writes	155	0 Rate	0 /sec	PACKETS_OUT	29
System Partition	3000	3000 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE_TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	76
								(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	
System Partition	3000	3000 reboots	Reboots	Reboots	121	4 Percent	1 %	OLLS+REBOOTS))*DELTA_TIME	8
BMC NT System Partition	3001	3001 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	=
BMC NT System Partition	3001	3001 badPolls	Bad Polis	Bad Polls	120	4 Percent	1 %	(100.0°BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_ POLLS+REBOOTS))*DELTA_TIME	29
BMC NT System Partition	3001	silodboop	Good Polls	Good Polls	118	4 Percent	7	(100.0*GOOD_POLLS/GOOD_POLLS+MISSED_POLLS+BA D_POLLS+REBOOTS))*DELTA_TIME	57
BMC NT System Partition	3001	3001 latency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY	81
o The Contra		-	Attend Dolla	Manage Bollo	077	toome v	3	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B	28
BINC NI System Partition	3000	2004 Enditing Standard	T	Part Stor Can	152	7 Rutes	4 (hytes)	TR FREQUENCY	24
BMC NT System Partition	3001	3001 partition Storage Used	Used	Part Stor Used	151	7 Bytes		TR_FRAME_COPIED	25
BMC NT System Partition	3001	3001 partition Utilization	Partition Utilization	Part Util	153	4 Percent	4 %	100 0*DELTA_TIME*TR_FRAME_COPIED/TR_FREQUENCY	62
BMC NT Sustam Dartition	3004	3004 reachability	Reachability	Reachability	182	10 Total Time	1 (%)	(REACHABLE TIME*100.0*DELTA_TIME/(TOTAL_TIME*1.0))	9/
		Carrier and the second					100	(100.0*REBOOTS/(GOOD_POLLS+MISSED_POLLS+BAD_P	8
BMC NT System Partition	3001	reboots	Reboots	Reboots	127	4 Percent	1 70	(AVAILABLE TIME*1000)	312
DIMIC DINIA SYSTEM PARTITION	3006	SOUZ availabinty	Avanability	Availability	5			(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
BMC UNIX System Partition	3002	3002 badPolls	Bad Polls	Bad Polls	120	4 Percent	1 %	POLLS+REBOOTS))*DELTA_TIME	29
RMC HNIX System Dartition	3002	PoodPolis	Good Polls	Good Polls	118	4 Percent	1 %	(100.0*GOOD_POLLS/(GOOD_POLLS*MISSED_POLLS*BA D POLLS+REBOOTS))*DELTA_TIME	22
BMC UNIX System Partition	3002	3002 latency	Latency	Latency	208		1 (msec)	LATENCY	81
DA4C HAUN Statem Destition	0000	mionod	Dolle	Missed Polls	14	4 Percent	%	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B) AD POLLS+REBOOTS)*DELTA TIME	28
BMC UNIX System Partition	3006	SOUZIMISSEULOUS		Sio i possila					

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	erement_type isymbol	.yiiiboi	label	SHOIL HOUSE	(val_lo (uilla	anits_id_idDet	units_type text	COL CASION	5
JNIX Process Set Excluded	3200 swaps	waps	Swaps	Swaps	266	0 Rate	0//sec	TR_CONTENTION_STREAMING	#
JNIX Process Set Excluded	3200 s	3200 systemCalls	System Calls	System Calls	295	0 Rate	0 /860	DLL_ALGN_ERRORS	11
UNIX Process Set Excluded	3200 ti	3200 threads	Threads	Threads	563	19 Size	4	TR_SET_RECOVERY_MODE	12
-	3200 tt	3200 totalPageFaults	Total Page Faults	Total Pg Faults	575	0 Rate	0//280	(TR_SIGNAL_LOSS+TR_BIT_STREAMING)	215
UNIX Process Set Excluded	3200 v	3200 virtualMemoryUsed	Virtual Memory Used	Vir Mem Used	150	7 Bytes	4 (bytes)	DLL_BCASTS	4
NT Process Set Excluded	3201 a	vailability	Availability	Availability	181	10 Total Time	1(%)	(AVAILABLE_TIME*100.0)	77
NT Drocese Sot Explision	4 5000	2004 Podeodio		allog pro	5	4 October	- 8	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	2
T	32016	3201 coul lifeation	CPITIHitzation	CPLLInitzation	206	4 Percent	1 %	I OLLOTTE OUT OF THE TIME	6
	7000	-0-0					? ;	(100.0*GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	
T	35018	STOLI BOODE OILS	Good Polis	Good Polls	811	4 Fercent	%	1400 Offus Reboots (100 Offus Republication	27
	3201 n	3201 missedPolls	Missed Polls	Missed Polls	119	4 Percent	7	(100.0 MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME	58
	3201 p	3201 physicalMemoryUsed	Physical Memory Used	Physical Memory	145	7 Bytes	4 (bytes)	DLL_MCASTS	.,
	3201 ti	3201 threads	Threads	Threads	563	19 Size	4	TR_SET_RECOVERY_MODE	12
	3201 t	3201 totalPageFaults	Total Page Faults	Total Pg Faults	575	0 Rate	0 /sec	(TR_SIGNAL_LOSS+TR_BIT_STREAMING)	215
	3300 a	3300 availability	Availability	Availability	181	10 Total Time	1 (%)	(AVAILABLE_TIME*100.0)	7.7
	40000	2000	off of the O	- H- C		Description	70	(100.0*BAD_POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	2
T	33000	2300 paul littration	Collification	Cold Hills	120	4 Percent	8 6	POLLS+REBOOLS) DELIA IIME	Se C
T	33000	3300 diskBlockBoads	Diek Block Deade	Diek Bit Boade	288	O Data	000/0	DIL TDANSITS	
t	3300	3300 diskBlockWrites	Disk Block Writes	Disk Bik Writes	587	O Rate	200/0	DI FINET FRAMES	٩
	3300	3300 accedDalle	Cond Dolle	alva pood	118	A Borront	8	(100°GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA	7
T	3300 h	3300 hardPageFaults	Hard Page Faults	Hard Page Faults	565	O Rate	0//sec	TR SIGNAL LOSS	13
	3300h	3300 hardPageFaultsPct	Hard Page Faults %	Hard Po Faults %	573	4 Percent	%	100 0*DELTA_TIME*(TR_SIGNAL_LOSS/(TR_SIGNAL_LOSS +TR_BIT_STREAMING))	213
T	3300 latency	itency	Latency	Latency	208		1 (msec)	LATENCY	81
	3300 m	3300 missedPolls	Missed Polls	Missed Polls	119	4 Percent	<u></u>	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD POLLS+REBOOTS)*DELTA TIME	58
T	3300 In	3300 Inetwork Messagestn	Network Messages In	Net Msgs in	588	0 Rate	0/sec	DLL_COLLISIONS	6
T	3300 n	3300 networkMessagesOut		Net Msgs Out	589	0 Rate	oes/0	DLL_ERRORS	10
T	3300 p	3300 physicalMemoryUsed	Physical Memory Used	Physical Memory	145	7 Bytes	4 (bytes)	DLL_MCASTS	3
T	3300 8	3300 softPageFaults	Soft Page Faults	Soft Page Faults	564	0 Rate	0//860	TR_BIT_STREAMING	14
	3300 8	waps	Swaps	Swaps	266	0 Rate	0 /sec	TR_CONTENTION_STREAMING	15
	3300 8	3300 systemCalls	System Calls	System Calls	562	0 Rate	0//sec	DLL_ALGN_ERRORS	Ξ
	3300 threads	reads	Threads	Threads	563	19 Size	4	TR_SET_RECOVERY_MODE	12
H	3300 tc	3300 totalPageFaults	Total Page Faults	Total Pg Faults	575	0 Rate	0 /sec	(TR_SIGNAL_LOSS+TR_BIT_STREAMING)	215
1	3300 ^	3300 virtualMemoryUsed	Virtual Memory Used	Vir Mem Used	150	7 Bytes	4 (bytes)	DLL BCASTS	4 1
1	3301 a	3301 avaitability	Availability	Availability	ō	10 FORM LIME	(%)	(100.0*BAD POLLS/(GOOD_POLLS+MISSED_POLLS+BAD_	
_	3301 b	3301 badPolls	Bad Polls	Bad Polls	120	4 Percent	1 %	POLLS+REBOOTS))*DELTA_TIME	59
T	33010	3301 couUtilization	CPU Utilization	CPU Utilization	296	4 Percent	1 %	DLL_BYTES	2
	3301	aan acceptalls	Good Polls	Good Polls	118	4 Percent	- **	(100.0°GOOD_POLLS/(GOOD_POLLS+MISSED_POLLS+BA D_POLLS+REBOOTS))*DELTA_TIME	57
T	3301 latency	tency	Latency	Latency	208	11 Milliseconds	1 (msec)	LATENCY	81
	3301 m	3301 missedPolls	Missed Polls	Missed Polis	119	4 Percent	%	(100.0*MISSED_POLLS/(GOOD_POLLS+MISSED_POLLS+B AD_POLLS+REBOOTS))*DELTA_TIME	58
t	3301 10	3301 physical Memory Used	Physical Memory Used	Physical Memory	145	7 Bytes	4 (bytes)	DLL_MCASTS	3
T	3301 threads	reads		Threads	563	19 Size	4	TR_SET_RECOVERY_MODE	12
-	3304 fc	3301 totalPageFaults	Total Page Faults	Total Pq Faults	575	0 Rate	oes/lo	(TR SIGNAL LOSS+TR BIT STREAMING)	215
-	2011/05/05		ו כומן במאם ו מהוים	255	-	?			

Attorney's Docket No.: 00124-025001

APPENDIX C

TITLE: LIVEEXCEPTION SYSTEM

APPLICANT: MARK W. SYLOR, GEORGE IGLESIAS, JAY B. WOLF,

WILL C. LAUER AND LAWRENCE A. STABILE

teProfiles11	

Profile ID Prof	ID Pichle Name Elype Beneat Type		EType	Element Type	Description	MAN .	A MATORIA	Curation 15	FUR9 FOLIN	Variable	Difection	THESPORT AND	1,TOT	Variable handwidthin	above	25
1043 ATM	- Unusual Workload		105	ATM Port	Unusually high cells in	War	611	2 4	2 2	cellant	above	0 00	101	bandwithOut	above	25
ALTA CALO	- Unusual Workload	***************************************	2 2	ATMIN	Unacted by the calls by	War	200	15	20 00	cellsin	apove	6.66	1 TOT	bandwidthin	above	25
1043 ATM	- Thesast Workload		199	ATM Path	Unusually high cells out	War	Pu	15	80 UV	cellsOut	above	6 66	1 TOT	bandwidthOut	above	25
ATA STA	- finensi Workload		107	ATM Channel	Il louistrativ blob AAI 5 PDUs in	Warr	20	15	20 02	aalSPdusIn	apove	666	1 TOT	bandwidthin	above	25
A LONG TO A	- Chicago Working	1 .	210	ATMORPHIC	House of the Add & Dolle out	Warr	200	15	FOLIN	aalsPdusOut	above	6 66	TOT	bandwidthOut	above	25
10431ATM	10431ATM - Unusual Workload	1		ATM Channel	Unusually high cells in	Warn		120	:3	cellsin	above	18 86	ToT	bandwidthin	above	
1043 ATM	- University Workfoad	:	107	ATM Channel	Unusually high cells out	Warr	Ē	15	20 02	cellsOut	above	6 66	101	bandwidthOut	above	25
1023 ATM	for the Enterorise - Fallure			ATM Port	ATM Port Down	Critic	Je		30 AVAIL	avallability					_	
1023 ATM	1023/ATM for the Enterprise - Failure		105	ATM Port	ATM Port Speed in set too low	Mino		9	BO TOT	bandwidthin	above	100	Ļ			!
1023 ATM	٠,	1	105	ATM Port	ATM Port Speed in set too low	Mino		Q.	60 TOT	bandwidthin	apove	100	-			
1023 ATM			105		ATM Port Speed Out set too low	Mino	-	9	50 TOT	bandwidthOut	above	100			1	
1023 ATM	for the Enterprise - Falture		105	ATM Port	ATM Port Speed Out set too low	Mino	<u> </u>	9.	101	bandwidthOut	eyode	100	+		+	
1023 ATM	for the Enterprise - Fallure	1	5	:	Too many seconds with errors	MINO	. 1.	ام	0.0	errored seconds	apove				•	1
1023JATM	for the Enterprise - Failure		200		Too many seconds with severe errors	OEW	. -	ן הים	0.0	severroredoeconds	apone	Sic	-			
1023 ATM	for the Enterprise - Fallure		105	AIM Port	Too many unavailable seconds	5		;	20100	Unavariable	appone	5 *			,	
1023 ATM	for the Enterprise - Fallure		5 5	ATM Change	ATM Clean Down	3,5	-	L	30 AVAII	availability		:	-	:		ī Ī
4004 ATM	for the Externets T1 - Delay		, e	ATM Dort	Over Hillerd In	Mino	; ; .		FOTTOT	bandwidibin	apove	75		•	-	_
ATA	2 5		2 5	ATM Port	Over Hillized Out	Mino			10T 108	bandwidthOut	above	75	•			
1001 ATM	for the Enterprise T1 - Delay		, <u>c</u>	ATM Port	Too many CLP1 frames in	Mino		. 2	FOT TOT	clp1CellsInPct	above	.e				
1001 ATM	for the Enterprise T1 - Delay		105	ATM Port	Too many discarded cells in	Mino	_	15	TOT 09	discardsinPct	above	0.5			•	1
TOOLATM	for the E	: :	102		Too many discarded cells out	Mino	-	15	EOLTOT	discardsOutPct	apove	0.	•			
1001 ATM	for the E		107	ATM Channel	Too many AAL5 frames discarded	Mino	_	15	for rot	aal5PdusDiscardedPct	above	=:	1		-	
ATM	for the E	1	107	ATM Channel	Too many CLP1 frames in	Mino		15	60 TOT	dp1CellsInPct	above	Q			+	
1001 ATM!	or the Enterprise T1 -		102	ATM Channel	Too many discarded cells in	Mino	1	<u>.</u>	101	discardsinpot	apove	2 5		:		
1001 ATM	or the Enterprise		107	ATM Channe	Traffic in over SCR	Wino.	_	i i	TOTION	handwidthOut	ahove					
TOUT A IM FOR	the Enterprise	-	2 5	AIM Channe	Cure Helfred In	Minor	+	<u>. F.</u>	TOTION	bandwidthin	above	6	••••			
1002 ATM	for the Enterprise		105	ATMOST	Over Utilizad Ord	Minor		15	SOLTOT	bandwidthOut	above	06	-			
TOOS ATM	, i		2 2	ATM Port	Too many CLP1 frames in	Minor	-	<u>:</u>	50 TOT	clpfCellsInPct	above	.e	•		-	
1002 ATM	he Enterprise	,	105		Too many discarded cells out	MINO		15.	50 TOT	discardsOutPct	above	0.5				
1002 ATM for t	he Enterprise T3		107	ATM Channel	Too many AALS frames discarded	Minor		15	10T	aal5PdusDiscardedPct	above	•	-		1	
1002 ATM	١ž		107	ATM Channel	Too many CLP1 frames in	Minor	1	5	501TOT	cptCellsInPct	above	ē.				
1002 ATM for I	for the Enterprise T3 - Delay					Mino			10 TOT	discardsInPct	above	0.2	,			
1002 ATM	he Enterprise T3 - Detay		107	ATM Channel	Traffic in over SCR	Minor	-	15	50 TOT	bandwidthin	ароле	9	-			!
1002 ATM	for the Enterprise T3 - Delay	ļ	•		Traffic Out over SCR	Minor		15	50 TOT	bandwidthOut	above	100	1			
1024 ATM	4 ATM for the Service Provider - Fallure		105	ATM Port	ATM Port Down	Critic	- F		30 AVAIL	avallability	+		-			-
1024 ATM	for the Service Provider - Fallure	1		ATM Port	-	Minor		15	BO TOT	erroredSeconds	above	5 7		:	1	
1024 ATM		:	105	1	Too many seconds with severe errors	Major		-	30 TOT	sevErroredSeconds	above	6				1
1024 ATM	for the Service Provider - Fallure	1	105	ATM Port	Too many unavailable seconds	Critic	-	-	50 TOT	unavaitableSeconds	apove	ō	1		+	
1024 ATM	for the Service Provider - Fallure		106		ATM Path Down	Critic	-		30 AVAIL	availability			-	***************************************	+	
1024 ATM for the S	for the Service Provider - Fallure				ATM Channel Down	Colffe	; =		30 AVAIL	avallability	:		-	;	:	
1003 ATM	for the Service Provider 11 - Delay	:		ATM Port	Over Utilized In	Mino	1	15	30 TOT	bandwidthin	above	75	+		Ť	1 1
1003 ATM	ATM for the Service Provider T1 - Delay	-		ATM Port	Over Utilized Out	Minor		15	101	bandwidthOut	above	75	1		1	
1003 ATM	vider T1	١.	105		Policy Violations in	Minor	+	15	101 05	policyViolationsInPct	apone		+		-	
1003 ATM	vider T			ATM Port		Minor	-	15	101	policyViolationsOutPct	apone			: :::	1	:
1003 ATM	1003 ATM for the Service Provider T1 - Delay		105	ATM Port	1	Minor	-	15	101	ChooscardsOutPot	above	5	i -		-	1
MTAICOOL	wder T		105	ATM Port	Too many CLP1 frames in	Minor		15	101	cip1CellsInPct	apone	ior.				
1003 ATM	vider T		105	ATM Port	Too many CLP1 frames out	Mino		2	50 TOT	clotCellsOutPct	apone	10	+		1	
1003 ATM for	2		105	ATM Port	Too many discarded cells in	Minor	:	15	101	discardsinPct	apone	0	-	: ::	1	
1003 ATM	the Service Provider T	,	105		Too many discarded cells out	Minor	_,	£ .	101	discardsOutPct	above	000			•	:
1003 ATM	Service Provi	;	106	ATM Path	Over Utilized In	MINO		-	0 0	Dandwidinin	account of	96	+	1 1		
1003 ATM for the	Service Provider T	-		,	Over Utilized Out	OU .	-		100	Dardwidingul	apone	-	-		-	!
1003 ATM for the	Service Provider T	:	<u>e</u>		Too many CLP0 trames discarded	oulus -	-		101	chat Calle Det	above	100	- -	1	<u>-</u>	1
1003 ATM	ervice Provider T	-	2	Almrain	The many CLP I lighted and	Minor	-		101	discardsOutPet	above	0 9	; ;			
1003 ATM for the	for the Service Provider 11 - Delay	:	2 2	ATM Channel	Too many CI P0 frames discarded	Minor	-	52	BO TOT	clp0DiscardsPct	apove	0.1				
+003 ATM	ervice Provider T		401	ATM Channel	1	Minor		15	SO TOT	dp1CellsPct	above	10			1	-
1003 ATM for the S	ervice Provider	t	107		Too many discarded cells in	Minor	;	5:	10T	discardsInPct	apone	0 5			and the	
1003 ATM for the	for the Service Provider T1 - Delay	:	107		Too many discarded cells out	Minor	1	2	101	discardsOutPet	apove		1		+-	,
1003 ATM	Service Provider T		107	-	- 1	Minor		13	10100	Dandwidthin	Boove	100	1		-	
1003 ATM for the	for the Service Provider 11 - Delay		107	ATM Channel	Traffic Out over SCR	Minor		1 4	101	bandwidthio	above	9	+			
1004 ATM	for the Service Provider T3 - Detay	 -		ATM Port	Over Utilized In	MINO.		5 K	10.0	handwidth Out	above .	Č				_
1004 ATM for	for the Service Provider T3 - Dela	~,·	103	,	Over Officea Out	i din	,		TOT	policyVolationsinPct	above	:2	•			
1004;ATM	for the Service Provider 13 - Deta		ğ	ATM POLI	Dollar Molations Out	Minor		15	30 TOT	policyViolationsOutPct	above	2		1	-	I
1004 ATM	for the Service Provider 13 - Dela		2 5	TOLEN T	Too many C. DO framer decrarded	Minor	: -	15	TOT	dp0DiscardsOutPct	apove	0.1				:
1004 ATM	for the Service Provider 13 - Dela			•		Minor	! 	151	so ToT	dp1CellsInPct	apone	10				
1004 ATM	for the Service Provider 13 - Uda	,	3 5	ATM Port	Too many CLP1 frames out	Minor	1	15	30 TOT	dp1CellsOutPct	above	10			1	
1004 ATM	for the Service Provider 13 - Deta	ı	5 5	ATM Port	Too many discarded cells in	Minor		15	30 TOT	discardsinPct	above	0.5				:
1004 ATM	or the service Provider 13 - Usa	ş	310	•	To many discarded cells out	Minor		15	30 TOT	discardsOutPct	above	0.5		1	:	ı
1004 ATM	for the Service Provider 13 - URB		2 5		Dover Utilized In	Minor		15	TOT	bandwidthin	врохе	100			1	
1004 A I M	for the service Provider 13 - Usia		9	ATMPath	Over Utilized Out	Minor	<u>. </u>	15	30 TOT	bandwidthOut	above	100				
뭐	for the service Provider 13 - Usas		9	ATMPath	Too many Cl P0 frames discarded	Minor		15	30 TOT	clp0DiscardsPct	above	0.1	-			
1004 ATM	to the Service Provider T3 - Delay	:	1		Too many CLP1 frames In	Minor		5	30 TOT	dp1CellsPct	above	10			÷	ı
1004 ATM	of the Service Doubler T3 - Delay		9	ATMPath	Too many discarded cells out	Minor		15	30 TOT	discardsInPct	above	0.5			-	1
ATA ATA	or the Service Provider T3 - Delay		100	ATM Channel	Too many CLP0 frames discarded	Minor		5	70T	clp0DiscardsPct	above	0.1			+	
1004 ATM	or the Service Provider T3 - Delay		107	ATM Channel	Too many CLP1 frames in	Minor		15	101	dp1CellsPct	above	010	-			-
1004 ATM	or the Service Provider T3 - Delay		107	ATM Channel	Too many discarded cells in	Minor		<u>.</u>	0 0	discardsin-ct	apone		1			1
1004 ATM for the	04 ATM for the Service Provider T3 - Delay	1	107	ATM Channel	Too many discarded cells out	Minor	-	15	10100	discardsCutPct	apove	ř o	-			

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1052 Ethernet Shared Segment - Unusual Workload	2	MIB2 LAN Port	Unusually high non-unleast frames in	Warning	15 60 UV	nonUnicastIn	apove	101 1 8.99	bandwidthin	apove	9
Frame Relay - U	101	Frame Relay	Unusually high frames in	Warning	15 60 UV	framesin	above	99.9	bandwidthOut	above	10
	101	Frame Relay	Unusually high frames out	Warning	15 60 UV	framesOut	above	666		†	Ī
,		Ì	Congestion in network on inbound data received	Minor	15	lecnInPct	above	2			;
1008 Frame Relay for the Enterprise - Delay	101	Frame Relay	Concestion in network on inbound data received under	Major	151 09 101	feculnPct	above	2 1	bandwidthin	apove	150
1008 Frame Relay for the Enterprise - Delay	_	Frame Relay	Congestion in network on outbound data sent	Minor	15 60 701	becliped	above	10111	OSDOMOTHIO	моје	90
	_	Frame Relay	Congestion in network on outbound data sent over CIR	Major	15 60 TOT	becninPct	above	2 1 101	bandwidthOut	above	150
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1008 Frame Relay for the Enterprise - Delay	101	Frame Relay	Over CIR Out	Warning	151 60 101	DandwidthOut	above	150			
1008 Frame Relay for the Enterprise - Delay	101	l		Minor	15 60 101	deFramesInPct	above	200	1 1 1 1	1	
1027 Frame Relay for the Enterprise - Palking	101		Frame Relay Circuit Down	Critical	30 AVA	IL availability		1		1	:
1009 Frame Relay for the Sector Provider Delay	5		Too many errors	Major	15 60 TOT	errorsPct	above	. 90	:	:	Į.
1009 Frame Relay for the Service Provider - Delay	100	Frame Relay	Backward concession sent instream to sender	Minor	10109	becnin	above	7717		:	1 ,
1009 Frame Relay for the Service Provider - Delay	101	Frame Relay	Forward congestion received from upstream	Winor	101	fecult	apone	N 6		•	
1009 Frame Relay for the Service Provider - Delay	101	Framo Relay	Forward congestion sent downstream to receiver	Minor	15 60 TOT	fections	above	v*c			_
1005 Frame Relay for the Service Provider - Delay	L		Over Utilized in	Minor	15 60 TOT	Dandwidthin	above	0		:	
1009 Frame Relay for the Saylor Provider - Delay		Frame Relay	lover Utilized Out	Minor	15 60 TOT	bandwidthOut	apove	100			1
1028 Frame Relay for the Service Provider - Fallure	, 	Frame Relay	Frame Relay Circuit Down			orscardsPCt	above	- - -	:		
		Frame Relay	Too many errors	Major	15 - 60 TOT	erorsPct	above	1	:	-	
1036 Host - Latency 2 second limit	200	Router	Latency to host too high	Minor	15, 80,TOT	latency	above	2000		<u> </u>	
1036 Host - Latency 2 second first	100	Router	Latency to host too high	MInor	15 60 TOT	latency	apove	2000			:
1036 Host - Latency 2 second limit		Managewise Server	Latency to nost too high	Minor	151 601701	latency	apove	2000	: :		-
1036 Host - Latency 2 second limit	302	Insight Manager Server	Latency to host too high	Minor	151 60 101	Hatency	apone	2000		+	
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1036 Host - Latency 2 second limit	304	BMC Unix Server	Latency to host too high	Minor	15 60 101	latency	above.	2000	•	-	
	306	Empire Unix Server	Latency to host for bloh	Minor	TOT OR TOT	latency	apone	2000		_	
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1007 Host - Unusual Latency		Router	Latency to host unusually high	Minor	15 80 UV	latency	above			<u> </u>	
1007 Host - Unusual Latency	-	Generic Server	Latency to host unusually high	Minor	15 60 UV	latency	above	97.7			
	100.00	Managewise Server	Latency to host unusually high	Minor	15	latency	above	97.7			
1002/Host - Unising Laborer	305	Day Na Server	Latency to host unusually high	Minor	200	latency	above	97.7			
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1011 Remote Access - Delay	750	i	CPU too busy	Minor	ToT on	Couttilization	above		:	+ + +	:
ccess - Delay	1	Modem Pool	Modems over used	Minor	15 60 TOT	modemsBusyPct	above	88			
1030 Remote Access - Falture	-	1 1	Free memory too low	Major	5 60 TOT	memoryFree	below	2000000			
1030 Xemote Access - Fallure	1,23		Remote Access Server Down	i i i i i i i i i i i i i i i i i i i	30 AVAII	L avallability	+	-	:		:
1030 Remote Access - Falture	725	RAS	Too many frame errors on dial-in	Malor	15 Soltor	framefroxPct	- above		ī.	:	
1030 Remote Access - Falture	725		Too many modern errors	Major	15 60 TOT	modernErrors	above	100		 	
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Remote Access - Unusual Workload	Ĺ	RAS	Unusually high bits in	Warning	15 60 UV	bitsin	above	10T 1 6 66	connect Time	apone	. 25
1047 Remute Access - Unusual Workload	- 122		University fight property time %	Variable	2000	plisour	above	1011	connectTime	apove	52,15
1047 Remote Access - Unusual Workfoad	3		Unusually high connections	Warning	16 80 UV	connections	above	99 1 00	connections	apove	20
	725		Unusually high memory utilization	Warning	15 60 UV	memoryUsed	above	99 1 DP	memoryUsed	above	10
1047 Remote Access - Unusual Workload	_	KAS	Unusually low connect time %	Warning	12	connect time	pelow	401	connectTime	pelow	200
1047 Remote Access - Unusual Workland	750	DAR CDI I	Universally Mak Cells adlibation	Varning	15	memoryused	Delow	107	memoryUsed	Delow	35
1047 Remote Access - Unusual Workload	750	•	Unusually low CPU utilization	Narning	15 60 UV	cpuUtilization	below	100	countilization	below	792
1047 Remote Access - Unusual Workload	77.5	Modern Pool	Unusually high connect time %	Varning	15 60 0.7	connectTime	above	10T 1 10T	connectTime	above	
1047i Remote Access - Unusual Workload		Modem Pool	low connect the	Varning	15 60 UV	connectTime	below	99 1 DP	connectTime	below	20
	1000	Response Path	Destination unreachable	Aaior	5 60 TOT	falledAttempts	above	VOL. 102	espouse	Moleco	S.
1012 Response - Delay	1	Response Path	Increased minimum response - possible route change	Varning	60 120 DP	minResponse	above	20 1 07	minResponse	above	. 95
1012 Response - Delay			No attempts made	Asjor	15 60 TOT	attempts	below	0.001			
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1012 Response - Delay			Decreased minimum response - possible route change V	Varning	60 120 DP	minResponse	below	20 1 UV	minResponse	below	95
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1012 Response - Delay		Response Path w/ Jitter	Response over limit	falor	15 60 TOT	responseVsGoal	above	100			
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1012 Response - Delay	208	1	Foo much litter	lator fator	15 60 101	avnRespTime	above	95			
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Attorney's Docket No.: 00124-025001

APPENDIX D

TITLE: LIVEEXCEPTION SYSTEM

APPLICANT: MARK W. SYLOR, GEORGE IGLESIAS, JAY B. WOLF,

WILL C. LAUER AND LAWRENCE A. STABILE

LiveExceptions Default Profile White Paper Version 1.9

June 6, 2000

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1 Introduction

This document describes the default profiles shipped with LiveExceptions in eHealth 4.7. It also describes their alarms, and possible actions to take to identify and correct the problem.

For a general overview of LiveExceptions, please read the white paper "An Introduction to LiveExceptions" before reading this document.

1.1 Audience

The primary audience of this document are the people in the Network Operations Center (NOC) responsible for resolving performance and failure problems in the network, systems, and applications being monitored. For you, the document describes each of the alarms raised by the default profiles provided in the product.

You should be familiar with Trend, At-a-Glance (AAG), and TopN reports provided in EHealth, and with using the Web User Interface to run and view those reports. You should also be familiar with using the LiveTrend user interface to monitor trend variables in real time. This document describes each alarm and recommends possible actions you can take to diagnose and repair the problem.

The secondary audience of this document is the LiveExceptions administrator who sets up profiles, and applies them to groups (or group lists) of elements as subjects for LiveExceptions to monitor.

For you, this document describes the alarm rules that make up each profile in detail. It describes what kinds of elements to which the profiles should be applied. It also forms a base from which you can develop your own rules and profiles. It describes some techniques used in developing good rules that minimize false alarms.

1.2 Profiles, Alarm Rules, and Technologies

Each profile defined below defines a collection of alarm rules that apply to a particular technology, and detects particular kinds of problems. The technology to which a profile applies, corresponds to a group technology. The technology is sometimes refined to apply to more specific kinds of elements. For example, the WAN delay profiles apply only to WAN ports, not to the ATM or Frame Relay Circuits that might be carried over them. Further, they differ based on the link speed -- faster links can sustain a higher utilization than slower links. The kinds of profiles and the problems they detect include:

- Delay profiles, which raise an alarm when an element is contributing to delay, either by being over utilized, or
 if we detect congestion.
- Failure profiles, which raise an alarm when the element is down. It also raises an alarm if the element is suffering too many errors (and thus has effectively failed), or if it is in danger of failing -- perhaps because it is running out of some key resource, like inodes on a Unix Partition.
- Unusual workload profiles, which raise an alarm if the workload presented to an element, or the work done by an element is unusual when compared against a historical baseline.
- Host latency profiles, which raise an alarm if the latency to a host is unusually high, or beyond any reasonable limit.
- Response profiles, which raise an alarm if response time problems are detected.

Each profile is described in a separate table, with an entry in the table for each alarm rule (or set of closely related rules). Included in each table are the algorithm used, the variables examined, any thresholds and parameters used in

the rules, the window examined, the severity of the alarm, a description of what the alarm means, and recommended steps you should take to diagnose and repair the problem detected.

1.3 Alarm Rule Algorithms

LiveExceptions includes a family of algorithms that detect problems. These algorithms are implemented in the LiveExceptions Server, a background process that monitors the data collected by eHealth. These algorithms are invoked by alarm rules that are written in profiles. The profiles are applied to specific groups of elements, and this instructs the LiveExceptions Server on what things to watch, and what alarms to raise. Alarm rules indicate the problem detection algorithm to use, what element types and variables to watch, and a parameters that control the algorithm such as thresholds, windows, and baselines.

Each algorithm is described in a section below. Within the tables that describe the profiles, each alarm rule refers to the algorithm(s) used by an abbreviation. The abbreviation for each algorithm is given below.

1.4 Time Over Threshold (TOT)

The time over threshold algorithm measures a variable against a fixed threshold on each poll period. It remembers the results over the recent past and measures how much time the variable was above (or below) the threshold. The period of time the algorithm looks back is called the "window", and is typically an hour.

An example of a rule using the TOT rule as written in the tables below is

Rule: (TOT, Bandwidth Utilization > 60%)

Window: 15/60 min

Parameters for the Time over threshold algorithm are:

Parameter	Description
Variable	The trend variable examined. In the example, Bandwidth Utilization.
Threshold	The value compared against. In the example, > 60%.
Analysis window	All of the samples collected during the analysis window (from the current sample time back) are examined. In the example, 60 minutes.
Condition window	The amount of time the condition must be true to raise the alarm. In the example, 15 minutes.

1.5 Time Over Dynamic Threshold (TODT)

This algorithm compares the value of a trend variable against a dynamically computed threshold. Like the Time over threshold algorithm it compares the recent samples within the window against the threshold. If enough samples are above (or below) the threshold, an alarm is raised. We measure the window and duration as monitored times, not as numbers of samples.

The threshold is computed dynamically, and sets the threshold far enough below a limit so it is unlikely that the variable will exceed some limit soon. An example is with partition space. If the partition becomes full, programs won't be able to write files, and the system may come to a halt. The system manager wants an alarm to be raised when the partition is **nearly full**. But when is the partition nearly full?

The TODT algorithm determines when a partition is nearly full by looking at recent history over a baseline period of the past few weeks. The algorithm determines how much the partition utilization typically grows and shrinks over that period. It computes the variation seen in a trend variable over the entire baseline. Variation in a variable is measured using a statistic called the standard deviation. From this standard deviation, the algorithm computes how

much room should be left free. This computation uses a percentile value specified in the rule. The larger the percentile, the larger the variation left free. This variation is then subtracted from the limit to determine the dynamic threshold.

An example of a rule using the TODT rule as written in the tables below is

Rule: (TODT, Partition Utilization > 95th percentile below 100%)

Window: 5/60 min Baseline: 2 weeks

Parameters for the TODT algorithm are:

Parameter	Description
Variable	In the example, Partition Utilization.
Limit	In the example, 100%.
Percentile	In the example, 95%.
Baseline	In the example, 2 weeks.
Analysis window	In the example, 60 minutes.
Condition window	In the example, 15 minutes.

In the example, consider a 100 Mbyte partition whose space used has followed a very simple pattern. The partition starts at midnight 25% full. Every day, at midnight, a program runs which creates a 15 Mbyte temporary file, increasing the partition space utilization to 40%. Every day at noon, another program comes and deletes that file, returning the partition space utilization to 25% full.

If this pattern persists through the entire baseline, it is fairly easy to compute that the standard deviation is 10.6%. Using a percentile of 95%, that corresponds to a predicted variation of about 17.5%. Which means the dynamic threshold would become 82.5%. As long as the partition space utilization stayed below that figure, no alarm is raised.

Now suppose one afternoon, someone creates a 50 Mbyte file on the disk. Partition space utilization increases to 75%, and all seems well. At midnight, the temporary file is created, partition utilization rises to 90%, and an alarm is raised.

See section 12.2 for more information on statistics used in LiveExceptions.

1.6 Deviation from Normal Algorithms

Three closely related algorithms compare the value of a trend variable against its normal range of values. The normal values are computed over a baseline period (typically 6 weeks) for each hour and for each day of the week. The baseline calculation determines the mean (average value) of the variable. It also computes a statistical measure of how much the variable varies, called the *standard deviation*. From this information, the deviation from normal algorithm can use one of three techniques for determining whether the value is normal:

- absolute from mean
- · percentage from mean
- · deviation from mean

All three algorithms can detect if the current value is above, below, or outside (either above or below) the normal range. They all use the Time Over Threshold window to reduce noise, that is, they only raise an alarm if the value is above, below, or outside the normal range for more that the condition window, out of the analysis window.

1.7 Absolute From Mean (AFM)

Absolute from mean detects when the value is a fixed amount above or below the mean. This technique is most useful for detecting when a value has changed from a fixed or stable configuration. For example, this could be used to detect when a file system has been reconfigured and changes capacity.

An example of a rule using the AFM rule as written in the tables below is

Rule:

(AFM, Total Buffers 10 buffers below mean)

Window:

15/60 min

Parameters for the AFM algorithm are:

Parameter	Description	
Variable	In the example, Total Buffers.	
Direction	In the example, below the normal range.	
Absolute deviation	In the example, 10 buffers.	
Baseline	The length of the baseline history used to compute the mean.	
Analysis window	In the example, 60 minutes.	
Condition window	In the example, 15 minutes.	

1.8 Percent From Mean (PFM)

Percentage from mean detects when the value is above the mean by a percentage. For example, 100% above the mean detects when the value is twice the mean value. This technique is useful for detecting large changes in a value, in proportion to the average value.

An example of a rule using the PFM rule as written in the tables below is

Rule:

(PFM, Broadcasts above 100% of mean)

Window:

15/60 min

Parameters for the PFM algorithm are:

Parameter	Description
Variable	In the example, Broadcasts.
Direction	In the example, above the normal range.
Percentage deviation	The value added (or subtracted if below) the mean to establish what is normal.
Baseline	The length of the baseline history used to compute the mean.
Analysis window	All of the samples collected during the analysis window (from the current sample time back) are examined. In the example, 60 minutes.
Condition window	The amount of time the condition must be true to raise the alarm. In the example, 15 minutes.

1.9 Deviation From Mean (DFM)

Deviation from mean detects when the value is above the mean by a dynamic percentile. The Percentile is computed dynamically based on the standard deviation. The higher the percentile, the further from the mean the value must be to raise the alarm. Deviation from mean dynamically determines both the mean and variation of the data. It adapts to cases where the mean changes, but the trend variable stays very close to the mean (a small standard deviation), and also to cases when the mean remains the same, but the variation from the mean is wide. Most of the rules in the unusual workload default profiles use the deviation from mean algorithm, often combined with the percentage from mean algorithm to eliminate small divergences from normal. This is described further in section 12.1.

An example of a rule using the DFM rule as written in the tables below is

Rule:

(DFM, Users above 99th %-tile)

Window:

15/60 min

Parameters for the DFM algorithm are:

Parameter	Description
Variable	In the example, Users.
Direction	In the example, above the normal range.
Percentile	In the example, 99 th percentile. Refer to section 12.2 for a longer description of percentiles and standard deviations.
Baseline	The length of the baseline history used to compute the mean.
Analysis window	In the example, 60 minutes.
Condition window	In the example, 15 minutes.

1.10 Availability (Avail)

The availability algorithm detects when an element is unavailable. The alarm will be cleared once eHealth sees that the element has been up for at least the length of the window defined in the alarm rule. The purpose of the window is to raise a single alarm when an element is "bouncing" up and down repeatedly.

For hosts, routers, switches, servers, and remote access servers (RAS), when the host goes down, eHealth will be unable to ping or poll the host's agent. This will be seen as a Reachability problem first (see section 1.11 below). Later, when the host reboots and comes back up, eHealth will be able to ping and poll the host's agent. It will see that the host had rebooted, and was down, and will raise an alarm at that time.

When the child elements within LAN and WAN interfaces, modems, ISDN, CPUs, disks, partitions, processes, process sets, and response paths hosts, go down, the host's agent may remain up and can be pinged and polled. In those cases, eHealth can detect that the child has gone down when it polls the element, and raise an alarm immediately.

Parameters used in the algorithm:

Parameter	Description
Availability window	The availability alarm will be active if the element has gone down at any time during the window. It will only clear when the element has been up for the entire window. The alarm will be raised for at least one poll period

1.11 Reachability (Reach)

The reachability algorithm detects when a ping of an element's agent IP address fails.

For hosts, when the host goes down, the agent address stops responding to pings and a reachability alarm is immediately raised for the host. The normal sequence of events when a host goes down is:

- 1. The host goes down.
- 2. eHealth pings the host's agent IP address, the ping times out. eHealth retries the ping. When all the tries time out, the ping fails and a Host Unreachable alarm is raised.
- 3. Eventually, the host reboots and comes back online.
- 4. *e*Health pings the host's agent IP address, the ping succeeds. *e*Health then polls the host's agent and learns that the host rebooted, and that the host was unavailable for some time, and raises a **Host Down** alarm.
- 5. If eHealth is able to ping the host's agent IP address for a continuous time equal to the window defined in the rule, the reachability alarm is cleared.

Most child elements within a host, have the same agent IP address as their host parent. eHealth only pings an IP address once, and the results of that ping are used for all the elements with the same address. All the children have the same reachability as their parents. The default profiles therefore do not define reachability alarm rules for children. Instead these are limited to parent hosts.

Parameters for the reachability algorithm are:

n.			ete	
rи	ги	111	PI P	я

Description

Reachability window

The window determines how quickly the alarm is cleared.

If the element was unreachable during the window, the alarm will stay active. It only clears when the element has been reachable for the entire window. The purpose of the window is to raise a single alarm when an element's reachability is "bouncing" up and down repeatedly.

2 Ethernet Profiles

The profiles for Ethernets cover three cases:

- Ethernet Shared, Ethernet segments built using 10base2 or 10base5 cabling systems (Thin Wire and Thick Wire Ethernet cables), or shared 10baseT or 100baseT Ethernets built around shared hubs.
- Ethernet Dedicated Full Duplex Switch Port, segments with only two stations. This profile is appropriate for dedicated Ethernet segments between a LAN switch and a device (router, system, or another switch). It is not appropriate for a segment where the switch port is connected to a hub. In that case, use the Delay Shared Ethernet profile.
- Ethernet Dedicated Half Duplex Switch Port, segments with only two stations, operating in Half Duplex mode. This is most often seen as the Ethernet segment between a LAN switch and a device (router, system, or another switch) where the switch port is set to operate in Full Duplex mode.

The LAN element types used in eHealth are:

Ethernet, which most often is a shared Ethernet. MIB2LAN can fall into any of the above three cases;
 MIB2LAN Full Duplex can only be a Ethernet Full Duplex Switch Port.

2.1 Ethernet - Delay Profiles

For Ethernet elements, Concord provides the following delay profiles:

- Shared Ethernet Delay, see Table 1.
- Ethernet Dedicated Half Duplex Switch Port Delay, see Table 2.
- Ethernet Dedicated Full Duplex Switch Port Delay, see Table 3.

Bandwidth Utilization and Ethernet Elements

This section describes Bandwidth Utilization In and Out variables and how their actual implementation depends upon the element's agent. It is useful for understanding Too Many Discards Out and Over Utilized In/Out messages.

For an Ethernet element, Bandwidth Utilization In and Bandwidth Utilization Out are based on the Bytes In and Bytes Out on this interface. The total Bandwidth Utilization is based on the total Bytes for the Ethernet segment, which is either all the bytes seen on the wire, or simply the sum of Bytes In and Bytes Out on the interface. Which is true depends on the agent and what it measures, and on the MTF used to poll the agent as shown in the table below:

If the Agent Implements	Bandwidth Utilization is Based On
RMON etherStats table defined in RFC1271	Promiscuous mode counts every frame and byte on the
or	wire. The Bandwidth Utilization is the total utilization
RFC1757	on the wire.
and	
places the MAC interface into promiscuous mode	
MIB2 and the dot3 extensions in RFC1398	Bandwidth Utilization is based on Bytes In + Bytes Out.
or	
RFC1623	
or	
the SMIv2 version RFC1650	
Agents in Hubs typically implement proprietary MIBs	The agents generally count all the bytes and frames on the wire.

Table 1 Ethernet Shared - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Ethernet, MIB2LAN	TOT, Bandwidth Utilization (%) >40%	15/60 min	Minor	
Message:	Over Utilized			
Description:	The bandwidth utilization is too high for a shared Ethernet segment. High Utilization may lead to too many collisions and a loss of efficiency on the LAN. It can also lead to queuing delays in the stations on the LAN segment, as the station must wait to send frames on the LAN, and other waiting frames are delayed awaiting their turn.			
Recommendations:	 Upgrade the Ethernet LAN to a higher speed (100Mbit or 1Gbit) Reduce the number of stations on the LAN segment. One way to do this is split the shared LAN into multiple segments using a switch or bridge. Replace hubs with switches. Remove traffic from the LAN, for example, move a server to a switch port. Check if the segment really is shared, perhaps it really is a switch port. 			
Ethernet, MIB2LAN	TOT, Bandwidth Utilization In (%) >30% TOT, Bandwidth Utilization Out (%) >30%	15/60 min	Minor	
Message:	Over Utilized In			
· ·	Over Utilized Out			
Description:	The bandwidth utilization in or the bandwidth utilization out on this interface ¹ is too high for a shared Ethernet segment. High Utilization may lead to too many collisions and a loss of efficiency on the LAN. It can also lead to queuing delays in the stations on the LAN segment, as the station must wait to send frames on the LAN, and other waiting frames are delayed awaiting their turn.			
Recommendations:	 Upgrade the Ethernet LAN to a higher speed (100Mbit or 1Gbit) Reduce the number of stations on the LAN segment. One way to do this is split the shared LAN into multiple segments using a switch or bridge. Replace hubs with switches. Remove traffic from the LAN, for example, move a server to a switch port. Check if the segment really is shared, perhaps it really is a switch port. 			
Ethernet, MIB2LAN Message:	TOT, Collisions (%) >15% 15/60 min	Minor	· · · · · · · · · · · · · · · · · · ·	

¹ For an Ethernet element, Bandwidth Utilization In and Bandwidth Utilization Out are based on the Bytes In and Bytes Out on this interface. The total Bandwidth Utilization is based on the total Bytes for the Ethernet segment, which is either all the bytes seen on the wire, or simply the sum of Bytes In and Bytes Out on the interface. Which is true depends on the agent and what it measures, and on the MTF used to poll the agent. In general, if the agent implements the RMON etherStats table defined in RFC1271 or its replacement RFC1757, and places the MAC interface into promiscuous mode to count every frame and byte on the wire, the Bandwidth Utilization is the total utilization on the wire. If the agent simply implements MIB2 and the dot3 extensions in RFC1398, its replacement RFC1623, or the SMIv2 version RFC1650, then Bandwidth Utilization is based on Bytes In + Bytes Out. Agents in Hubs typically implement proprietary MIBs which generally count all the bytes and frames on the wire.

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Description:	When multiple stations try to send on an Ethermay collide. Ethernets use collisions to decide called CSMA/CD. Thus, on a shared Ethernet, However, too many collisions lead to a loss of collision and deciding which station can send u certain failures in Ethernet end stations can cau the collision detection circuit fails, then the stat collision, which in turn causes more collisions.	who will send first, usefficiency, as the time and bandwingse excessive collision will continue to	using a technique nal occurrence. he spent resolving a dth. Also note that ons. For example, if
Recommendations:	Same as for Bandwidth Over Utilized		
Ethernet, MIB2LAN	(DFM, Broadcasts > 99.9 percentile) AND (TOT, Broadcasts > 200 frames/sec)	15/60 min	Minor
Message:	Broadcast Storm		
Description: Recommendations:	Under certain conditions, the higher layer protocols using the LAN can generate too many broadcast frames. Broadcast and multicast frames pass through switches and bridges. Every station on the extended LAN must handle broadcast frames, and thus too many broadcast frames can have a significant impact on each station attached to the extended LAN. Note: An extended LAN is the entire collection of Ethernet segments interconnected by bridges and switches. Extended LANs are also called broadcast domains. • Determine the specific protocol or protocols causing the storm. For example, run		
	a Traffic Accountant report on protocols for LAN.	or a probe attached to	the extended
	Once the protocol generating too many broadcasts is identified, determine the		
	 reason why so many broadcasts are being s Replace a switch at the top of the switch his broadcast domains. 		er to separate
MIB2LAN, Ethernet	TOT, Discards Out % > 1%	15/60 min	Warning
Message:	Too many discards out		
Description:	This alarm will be raised only for LAN elemen MIB2LAN, and some Ethernet agents error! Books grows, eventually the router, host, or switch wi frames, and any additional frames that should l discarded. Discards are normal in IP networks drive the bottleneck link to saturation. The result of the TCP sender as discarded (lost) packets. In network efficiency, as the discarded packets metwork efficiency, as the discarded packets metwork efficiency.	Il run out of buffers oe sent out the interfect because the TCP proliting congestion is to common the many discards leaves.	an interface queue to hold the queued ace will be otocol is designed to hen signaled back

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Element Type Recommendations:	While most discards are due to queuing discards discard packets. Depending on the device, see if causing discards: If the link is over utilized, deal with it as de Over Utilized alarm. Note this may only me After increasing the speed, look to see if oth many discards or are now over utilized. Increase the number of buffers in the output link is not causing delay in the network, but is causing significant delay, adding buffers the discard rate significantly. Implement RED (Random Early Discards) supported by many routers and switches to	the the true that the true the bottleneck the true the bottleneck the links in the path that the true. This is only is still discarding can make it worse, on the link. RED is signal congestion the true true true true true true true tru	asons a router may reasons may be the discussion of the total and are now seeing too by appropriate if the packets. If the link without decreasing a technique to TCP flows before
	the queue fills. This has proven extremely e improving overall network performance. H on UDP or protocols other than TCP/IP pro	owever, if most of	the traffic is based

Table 2 Ethernet Half Duplex Switch Port – Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Ethernet, MIB2LAN	TOT, Bandwidth Utilization (%) >60%	15/60 min	Minor
Message:	Over Utilized		
Description:	See the discussion for Shared Ethernet above. Be segment (the switch port and the station), the bar than for a shared LAN.	ecause only two stat ndwidth utilization o	ions are on this can be much higher
Recommendations:	 Upgrade the Ethernet LAN to a higher speed (100Mbit or 1Gbit) Switch to a Full duplex switch port and station. Remove traffic from the LAN, for example, if a web server is attached to the 		
	switch port, add a second server, and split the	ne requests equally o	over the pair.
Ethernet, MIB2LAN	TOT, Bandwidth Utilization In (%) >50% TOT, Bandwidth Utilization Out (%) >50%	15/60 min	Minor
Message:	Over Utilized In Over Utilized Out		
Description:	The bandwidth utilization in or the bandwidth utilization out on this interface Error! Bookmark not defined. is too high for a Ethernet switch port. High Utilization may lead to too many collisions and a loss of efficiency on the LAN. It can also lead to queuing delays in the stations on the LAN segment, as the station must wait to send frames on the LAN, and other waiting frames are delayed awaiting their turn.		
	While there are only two stations on the LAN, be Half Duplex mode, they can still collide.	ecause the stations a	re operating in
Recommendations:	 Upgrade the Ethernet LAN to a higher speed Remove traffic from the LAN, for example, two servers. 	l (100Mbit or 1Gbit split the workload t) o a server across
Ethernet, MIB2LAN	TOT, Collisions (%) >15% 15/60 min	Minor	
Message:	Too many collisions		
Description:	See the discussion on "Collisions Too High" for stations on the LAN segment, the chances of a cothus more traffic can be sent and received on the efficiency.	ollision are significa	ntly reduced, and
Recommendations:	Same as for bandwidth over utilized		
Ethernet, MIB2LAN	(DFM, Broadcasts > 99.9percentile) AND	15/60 min	Minor
Message:	(TOT, Broadcasts > 200 frames/sec) Broadcast Storm		

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Description:	Under certain conditions, the higher layer pr many broadcast frames. Broadcast and multi bridges. Every station on the extended LAN' too many broadcast frames can have a signif the extended LAN. Note: An extended LAN is the entire collecti- bridges and switches. Extended LANs are al	cast frames pass throug must handle broadcast icant impact on each sta on of Ethernet segments	h switches and frames, and thus ation attached to
Recommendations:	 Determine the specific protocol or protorunning a traffic accountant report on prextended LAN. Once the protocol generating too many reason why so many broadcasts are bein Routers can be used to separate broadcas of the switch hierarchy with a router. 	rotocols, for a probe atta broadcasts is identified, g sent, and correct.	determine the
MIB2LAN, Ethernet Message: Description:	TOT, Discards Out % > 1% Too many discards out This alarm will be raised only for LAN elem MIB2LAN, and some Ethernet agents error! Both grows, eventually the router, host, or switch frames, and any additional frames that should discarded. Discards are normal in IP network drive the bottleneck link to saturation. The route to the TCP sender as discarded (lost) packets network efficiency, as the discarded packets	will run out of buffers to d be sent out the interfacts as because the TCP protesulting congestion is the control of the transfer of the trans	n interface queue o hold the queued ce will be tocol is designed to ten signaled back
Recommendations:	 While most discards are due to queuing may discard packets. Depending on the may be causing discards. If the link is over utilized, deal with it as move the bottleneck to another link. After other links in the path are now seeing to lincrease the number of buffers in the outlink is not causing delay in the network, is causing significant delay, adding buffer the discard rate significantly. Implement RED (Random Early Discard supported by many routers and switches the queue fills. This has proven extreme improving overall network performance on UDP, or protocols other than TCP/IP 	device, see if any of the state of the state of the speed, to many discards or are structured. This is only but is still discarding pers can make it worse, which is on the link. RED is a to signal congestion to ly effective in lowering. However, if most of the	this may only look to see if now over utilized. appropriate if the ackets. If the link without decreasing a technique TCP flows before discards, and the traffic is based

 $^{^2}$ An extended LAN is the entire collection of Ethernet segments interconnected by bridges and switches. Extended LANs are also called *broadcast domains*.

Table 3 Ethernet Full Duplex Switch Port - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Ethernet	TOT, Bandwidth Utilization (%) >90%	15/60 min	Minor
Message:	Over Utilized		
Description:	Refer to the discussion for Shared Ethernet above. Because only two stations a this segment (the switch port and the station), and because the link operates in duplex, the bandwidth utilization can be much higher than for a shared LAN or		
	dedicated, half duplex LAN.		
Recommendations:	Upgrade the Ethernet LAN to a higher sp.	and (100) this on 1 Chi	
Accommendations.	 Upgrade the Ethernet LAN to a higher sp Remove traffic from the LAN, for example 		
	switch port, add a second server, and split		
MIB2LAN Full Duplex,	TOT, Bandwidth Utilization In (%) >90%	15/60 min	Minor
Ethernet	TOT, Bandwidth Utilization Out (%) >90%	10,00 11111	1111101
Message:	Over Utilized In		
_	Over Utilized Out		
Description:	The bandwidth utilization in or the bandwidth		
	high. High Utilization may lead to queuing de	lays as waiting frames	are delayed
	awaiting their turn.		
Danaman dations.	TI . 1 d Ed	1/1001 (1) 1 (01)	
Recommendations:	• Upgrade the Ethernet LAN to a higher sp		
	Remove traffic from the LAN, for example	le, split the workload	on a web server
	across multiple web servers.		
Ethernet, MIB2LAN	(DFM, Broadcasts > 99.9percentile) AND	15/60 min	Minor
,	(TOT, Broadcasts > 200 frames/sec)		
Message:	Broadcast Storm		
Description:	Under certain conditions, the higher layer prof		
	many broadcast frames. Broadcast and multicast frames pass through switches and		
	bridges. Every station on the extended LAN must handle broadcast frames, and thus too many broadcast frames can have a significant impact on each station attached to		
	the extended LAN.	cant impact on each sta	ation attached to
	Note: An <i>extended LAN</i> is the entire collection	n of Ethernet seament	s interconnected by
		es. Extended LANs are also called broadcast domains.	
	8		
Recommendations:	Determine the specific protocol or protocol	ols causing the storm.	For example, run
	Traffic Accountant report on protocols for		
	 Once the protocol generating too many br 		determine the
	reason why so many broadcasts are being		
	 Routers can be used to separate broadcast 	domains, so replace a	switch at the top
	of the switch hierarchy with a router.		
MIDOLAN E. II D	TOT Discourds Out 9/ > 19/	15//0 *	137
MIB2LAN Full Duplex, Ethernet	TOT, Discards Out % > 1%	15/60 min	Warning
Ethernet Message:	Too many discards out		
Description:	This alarm will be raised only for LAN eleme	nts that collect interfa	ce statistics
Description:	MIB2LAN, and some Ethernet agents. When		
	1 1 1 11 111	o hold the queued fra	nes, and any
	router, host, or switch will run out of buffers t		, 1011 /
	router, host, or switch will run out of buffers t additional frames that should be sent out the it	nterface will be discar	ded. Discards are
	additional frames that should be sent out the informal in IP networks because the TCP proto-	nterface will be discar	
	additional frames that should be sent out the informal in IP networks because the TCP protolink to saturation. The resulting congestion is	nterface will be discar col is designed to driv then signaled back to	e the bottleneck the TCP sender as
	additional frames that should be sent out the innormal in IP networks because the TCP proto	nterface will be discar col is designed to driv then signaled back to	e the bottleneck the TCP sender as

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Recommendations:	 While most discards are due to queuing dismay discard packets. Depending on the demay be causing discards. If the link is over utilized, deal with it as demanded. 	ese other reasons	
	 move the bottleneck to another link. After other links in the path are now seeing too relationship links in the number of buffers in the output link is not causing delay in the network, but 	If the link is over utilized, deal with it as described above. Note this may only move the bottleneck to another link. After increasing the speed, look to see if other links in the path are now seeing too many discards or are now over utilized. Increase the number of buffers in the output queue. This is only appropriate if the link is not causing delay in the network, but is still discarding packets. If the link is causing significant delay, adding buffers can make it worse, without decreasing the discard rate significantly.	
	Implement RED (Random Early Discards) supported by many routers and switches to the queue fills. This has proven extremely improving overall network performance. Hon UDP, or protocols other than TCP/IP process.	signal congestion t effective in lowering lowever, if most of	o TCP flows before g discards, and the traffic is based

2.2 Ethernet Failure Profiles

For Ethernet elements, we provide the following failure profiles:

- Shared Ethernet Failure, see Table 4.
- Ethernet Half Duplex Switch Port Failure, see Table 4.
- Ethernet Full Duplex Switch Port Failure, see Table 5.

See the delay profiles for a description of when it is appropriate to use these three failure profiles.

Table 4 Ethernet Shared Segment – Failure, and Ethernet Half Duplex Switch Port – Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Ethernet, MIB2LAN	Availability	30 min	Critical
Message:	LAN Down		
Description:	How LAN availability is measured depends on the agent monitoring the LAN		
	 If the agent is built in to a hub or repeater, LAN is down. Note that some of the statio communicate, but the LAN will be partition. If the agent is a promiscuous listening state MAC stations supporting the etherStats Machine in the state of the LAN. 	ns on the LAN may oned. ion (for example an	still be able to RMON enabled
	determines the state of the LAN.	-42 MID J.C., . 1 : T	TC1204 1 :
	 If the agent is a station that supports the de RFC1643 and RFC1650 that replaced it, the state. 		
Recommendations:	 Drilldown to an AAG report for this LAN failure. 	to see if any probler	ns led up to the
Ethernet	TOT, Errors (%) > 5%		
Message: Description: Recommendations:	Too many errors The percentage of frames sent on the Ethernet Investigate	with errors is too hig	gh.
	Alignment errors		
	 Too many collisions 		
	 Late collisions 		
	 Runt (too small) frame 		
	 Babbling stations (stations always sending 	()	
Ethernet, MIB2LAN	TOT, Discards In % > 1%	15/60 min	Major
Message:	Received Frame discards		J
Description:	Too many frames were discarded after they we	ere received	
	A frame going through a router or switch gets receiving process (frames in), a forwarding procut). Layer 2 forwarding (done by a switch or forwarding (done by a router) forwards packet any of the three processes.	ocess, and a sending bridge) forwards fra	process (frames mes, while layer 3
	Frames lost in sending are generally lost due too many discards out above). Packets lost in layer 3 forwarding are general unknown or unreachable. Frames are rarely lost frames lost in receiving (In frames) can be lo The receive process may not have enough The router or switch may use input queue buffered (queued) in the receiving interface. shared memory where a central mem the receiving interface and sending in read and write the frames. output queueing where the frames are When a router or switch uses input queue input queues in the receiving interface fill	ly lost because the dest in layer 2 forward st for a variety of real buffers to hold the sing a technique who are hardware. Other cory is used to hold finterface access the sleep held in buffers in thing, if an outbound lest	estination is ing. asons: incoming frames. ere frames are lesigns are rames. In this design hared memory to the sending interface. ink is too busy, the

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Recommendations:	 Increase the amount of memory (buffers) If the router or switch uses input queueing 	, check the output int	-	
	 which (if any) are too busy. If any are, sol Check to see if there are any other errors of discard frames. 	-	this interface to	
Ethernet	TOT, Bandwidth Utilization > 100%	15/60 min	Minor	
Message:	Speed set too low			
Description:	The bandwidth utilization was measured at over 100%. This is most often caused by the speed being set incorrectly in the poller configuration.			
Recommendations:	 Check the speed of the shared segment. For example, if it is set to 10M speed really 100 Mbit/sec? 			
	 Check if the segment is really a full duple type (to MIB2LAN Full Duplex). This promay mean recertifying the device. 			

Table 5 Full Duplex Switch Port - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Ethernet	Availability			
Message:	LAN Down			
Description:	How LAN availability is measured depends on the agent monitoring the LAN.			
	If the agent is built in to a hub or repeate LAN is down. Note that some of the stat communicate, but the LAN will be partit If the agent is a promise and listening at	ions on the LAN may stioned.	still be able to	
	 If the agent is a promiscuous listening st MAC stations supporting the etherStats is determines the state of the LAN. 	he station		
		If the agent is a station that supports the dot3 MIB defined in RFC1284 a RFC1643 and RFC1650 that replaced it, then the station state determines state.		
Recommendations:	 Drilldown to an AAG report for this LA failure. 	N to see if any problen	ns led up to the	
Ethernet	TOT, Errors (%) > 5%	15/60 min	Major	
Message:	Too many errors			
Description:	The percentage of frames sent on the Ethernet with errors is too high.			
Recommendations:	Investigate			
	Alignment errors			
	Too many collisions			
	Late collisions			
	Runt (too small) frame			
	Babbling stations (stations always sending)	ng)		
Ethernet	TOT, Collisions (%) >0%	1/60 min	Major	
Message:	Misconfigured – collisions on Full Duplex		y	
Description:	Switch ports operating in full duplex mode si		ollisions. However,	
-	both the switch port, and the station must be		x. If either is	
	misconfigured, the LAN segment will experi	ence collisions.		
Recommendations:	Check that both the stations and the swit	tch nort support full du	nlev	
**************************************	 Check that both the stations and the switch port support full duplex. Check that both are properly configured to be in full duplex mode. 			
	You may have applied the full duplex pr			
Ethernet,	TOT, Discards In % > 1%	15/60 min	Major	
MIB2LAN Full Duplex	Received Frame discards	10,00 mm	1.10001	
Message:	Acceived Flame discalds			

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Description:	Too many frames were discarded after they were	received.	
	A frame going through a router or switch gets pro- receiving process (frames in), a forwarding process The frame (packet) can be discarded (lost) in any	ss, and a sending p	process (frame out).
	Packets lost in sending are generally lost due to que too many discards out above).		
	Packets lost in forwarding are generally lost becaunreachable.	iuse the destinatio	n is unknown or
Recommendations:	Packets lost in receiving (In frames) can be lost for the receive process may not have enough but the router or switch may use input queueing buffered (queued) in the receiving interface how the receiving interface and sending interface and write the frames. • output queueing where the frames are he when a router or switch uses input queueing input queues in the receiving interface fill up the Increase the amount of memory (buffers) allowed if the router or switch uses input queueing, which (if any) are too busy. If there are, solve the Check to see if there are any other errors which discard frames.	ffers to hold the in a technique when ardware. Other do is used to hold fra face access the shall eld in buffers in the if an outbound li and discard fram ocated to the recei- heck the output in the that problem.	accoming frames. The frames are resigns are times. In this design times are memory to the sending interface. The frames are the sending interface. The frames are the sending interface. The frames are t
Ethernet,	TOT, Bandwidth Utilization > 100%	15/60 min	Minor
MIB2LAN Full Duplex	Speed set too low		
Message: Description:	The bandwidth utilization was measured at over	100%. This is mo	st often caused by
Description.	the speed being set incorrectly in the poller confi		
Recommendations:	Check the speed of the shared segment. For a speed really 100 Mbit/sec?	-	t to 10Mit/sec is the

2.3 Ethernet - Unusual Workload Profiles

For Ethernets, three Unusual Workload profiles are provided. They are all the same.

Table 6 Shared Ethernet Segment – Unusual Workload, Ethernet Half Duplex Switch Port – Unusual Workload, and Ethernet Full Duplex Switch Port – Unusual Workload

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Ethernet	(DFM, Broadcasts above 99.9 percentile) AND (TOT, Bandwidth Utilization > 10%)	15/60 min	Warning
Message:	Unusually high broadcasts		
Description:	The number of broadcast frames on the LAN is unwith a test that Bandwidth Utilization is > 10% to small, values. Refer to 12.1.		
Recommendations:	 High broadcasts without high unicasts may pr ARP (the address resolution protocol used in lapackets to locate stations that have a particular forward a packet to that IP address. An unusus frames may indicate problems in ARP. Similarly, any other protocol that uses broadcast services may be having a problem finding tho A new application or protocol may have been uses broadcast frames. 	IP networks) send r IP address, or a ally high number ast frames to loca se systems or ser	Is broadcast router that can of broadcast te other systems or vices.
Ethernet	(DFM, Multicasts above 99.9 percentile) AND (TOT, Bandwidth Utilization > 10%)	15/60 min	Warning
Message:	Unusually high multicasts		
Description:	The number of multicast frames on the LAN is unwith a test that Bandwidth Utilization is > 10% to small, values. See 12.1.		
Recommendations:	 Multicast frames are used like broadcast frames in or services. Like broadcast frames, they flood thro However, because multicasts are protocol specific, protocol receive them and must process them. High multicasts without high unicasts may pr A protocol that uses multicast frames to locat having a problem finding those systems or set A new application or protocol may have been uses multicast frames. 	ugh the entire ex, only hosts partice ecede multicast see other systems or rvices.	tended LAN. cipating in the torms. r services may be
Ethernet	(DFM, Unicasts above 99.9 percentile) AND (TOT, Bandwidth Utilization > 10%)	15/60 min	Warning
Message:	Unusually high unicasts		
Description:	The number of unicast frames on the LAN is unus with a test that Bandwidth Utilization is > 10% to small, values.		
Recommendations:	A new application or protocol may have been	added to the Ext	tended LAN.
MIB2LAN Port, MIB2LAN Full Duplex	(DFM, Frames In above 99 percentile) AND (TOT, Bandwidth Utilization In > 10%)	15/60 min	Warning

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Description:	The number of frames on the LAN is unusually that Bandwidth Utilization is > 10% to filter out values.		
Recommendations:	A new application or protocol may have be	en added to the Ex	tended LAN.
MIB2LAN Port, MIB2LAN Full Duplex	(DFM, Non-Unicast Frames In above 99 percentile) AND (TOT, Bandwidth Utilization I > 10%)	15/60 min In	Warning
	(DFM, Non-Unicast Frames Out above 99 percentile) AND (TOT, Bandwidth Utilization Out > 10%)	1	
Message:	Unusually high non-unicast frames in Unusually high non-unicast frames out		
Description:	The number of non-unicast frames on the LAN with a test that Bandwidth Utilization is > 10% small, values.		
	MIB2LAN elements combine broadcast and mu non-unicast frames. As described above, broadc in protocols to locate systems and services.		
Recommendations:	 High broadcasts and multicasts without hig storms. 	t high unicasts may precede broadcast	
	 ARP (the address resolution protocol used in IP networks) sends broadcast packets to locate stations that have a particular IP address, or a router that can forward a packet to that IP address. An unusually high number of broadcast frames may indicate problems in ARP. 		
	 Similarly, any other protocol that uses broad other systems or services may be having a services. 		
	 A new application or protocol may have be uses broadcast or multicast frames. 	en added to the Ex	tended LAN that

3 Token Ring Profiles

Three profiles are provided for Token Ring LANs:

- Token Ring Delay, see Table 7.
- Token Ring Failure, see Table 8.
- Token Ring Unusual Workload, see Table 9.

Token rings can be represented by elements whose type is:

- Token Ring, which generally represents a station or hub that monitors the total traffic on the LAN
- MIB2 LAN, which generally represents a station on the LAN that monitors only the traffic it sends and receives.

3.1 Token Ring - Delay Profile

Table 7 Token Ring - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Token Ring, MIB2LAN	TOT, Bandwidth Utilization > 80%	15/60 min	Minor
Message:	Over Utilized		
Description:	The bandwidth utilization is too high for a shared Token Ring LAN. High Utilization leads to queueing delays in the stations on the LAN, as the station must wait for the token to be released by other stations before it can send a frame on the LAN, and other waiting frames are delayed awaiting their turn.		
Recommendations:	 Upgrade the Token Ring to a higher speed LAN, 4Mbps to 16Mbps, or upgrade to 100 Mbps FDDI or 100Mbps or 1Gbps Ethernet. Reduce the number of stations on the Ring. Remove traffic from the LAN. 		Abps, or upgrade to

TOT, Soft Errors > 0.1 errors/sec Too many soft errors	15/60 min	Minor
Too many soft errors		14111101
100 many 5010 011015		
Soft errors are recoverable errors at the MAC	layer of the LAN.	
1. Determine the specific type of error.		
2. Run a Trend Report for this Token Ring fo	r the days where the a	larm is active
selecting the following soft error variables	:	
 TR Abort Errors 		
 TR Address Copied Errors 		
TR Burst Errors		
 TR Congestion Errors 		
TR Frequency Errors		
TR Frame Copied Errors		
TR Internal Errors		
TR Line Errors		
 TR Lost Frame Errors 		
TR Token Errors		
	cked bar chart.	
•		e of soft errors hav
	, recension	
	 Determine the specific type of error. Run a Trend Report for this Token Ring for selecting the following soft error variables TR Abort Errors TR Address Copied Errors TR Burst Errors TR Congestion Errors TR Frequency Errors TR Frame Copied Errors TR Internal Errors TR Line Errors TR Lost Frame Errors TR Token Errors Select the chart style of stacked area or stars 	 Determine the specific type of error. Run a Trend Report for this Token Ring for the days where the a selecting the following soft error variables: TR Abort Errors TR Address Copied Errors TR Burst Errors TR Congestion Errors TR Frequency Errors TR Frame Copied Errors TR Internal Errors TR Line Errors TR Lost Frame Errors TR Token Errors Select the chart style of stacked area or stacked bar chart. The color of the areas or bars should identify which specific type

Element Type	Rule, Trend Variable, Threshold	Window	Severity
MIB2LAN	TOT, Bandwidth Utilization In (%) >50%	15/60 min	Minor
	TOT, Bandwidth Utilization Out (%) >50%		
Message:	Over Utilized In		
	Over Utilized Out		
Description:	The bandwidth utilization in or the bandwidth ut high for a Token Ring. High Utilization may lead		
	the LAN segment, as the station must wait for th		
	stations before it can send a frame on the LAN, a		
	awaiting their turn.	8	,
D 1.45		ANT 4141 (14)	
Recommendations:	 Upgrade the Token Ring to a higher speed I 100 Mbps FDDI or 100Mbps or 1Gbps Ethe 		Abps, or upgrade to
	• Reduce the number of stations on the Ring.		
	Remove traffic from the LAN.		
MIB2LAN	(DFM, Non-Unicasts > 99.9percentile) AND	15/60 min	Minor
	(TOT, Non-Unicasts > 200 frames/sec)		
Message:	Broadcast Storm		
Description:	Under certain conditions, the higher layer protoc		
	many broadcast frames. Broadcast and multicast		
	bridges. Every station on the extended LAN must handle broadcast frames, and thus		
	too many broadcast frames can have a significan	t impact on each st	ation attached to
	the extended LAN.		
Recommendations:	Determine the specific protocol or protocols	causing the storm.	For example, run
	a Traffic Accountant report on protocols for		
	LAN.	-	
	 Once the protocol generating too many broa 	dcasts is identified	, determine the
	reason why so many broadcasts are being se		
	 Routers can be used to separate broadcast do 	omains, so replace	a switch at the top
	of the switch hierarchy with a router.		
MIB2LAN	TOT, Discards Out % > 1%	15/60 min	Warning
Message:	Too many discards out		
Description:	This alarm will be raised only for Token Ring L.	AN elements that of	collect interface
~ 0001.p.10111	statistics MIB2LAN. When an interface queue grows, eventually the router, host, or		
	switch will run out of buffers to hold the queued		
	that should be sent out the interface will be disca		
	networks because the TCP protocol is designed to		
	saturation. The resulting congestion is then signs	aled back to the TO	P sender as
	discarded (lost) packets. Too many discards low		
	the discarded packets must be resent.		- ·

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Element Type Recommendations:	While most discards are due to queueing discard discard packets. Depending on the device, see causing discards: If the link is over utilized, deal with it as a move the bottleneck to another link. After other links in the path are now seeing too Increase the number of buffers in the outp link is not causing delay in the network, b is causing significant delay, adding buffer	rds, there are other re if any of these other described above. Not increasing the speed many discards or are ut queue. This is onlut is still discarding	easons a router may reasons may be e this may only l, look to see if e now over utilized. y appropriate if the packets. If the link
	 the discard rate significantly. Implement RED (Random Early Discards supported by many routers and switches to the queue fills. This has proven extremely improving overall network performance. I on UDP, or protocols other than TCP/IP protocols. 	o signal congestion to effective in lowering However, if most of	o TCP flows before g discards, and the traffic is based

3.2 Token Ring - Failure Profile

Table 8 Token Ring - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Token Ring	Availability	30 min	Critical
Message:	LAN Down		
Description:	 How LAN availability is measured depends of the agent is built into a hub or repeater LAN is down. Note that some of the state communicate, but the LAN will be partiful. If the agent is a promiscuous listening st MAC stations supporting the tokenring determines the state of the LAN. 	r, then if the hub or reptions on the LAN may tioned. ation (for example an	peater is down, the still be able to
Recommendations:	 Drilldown to an AAG report for this LA failure. 	N to see if any problen	ns led up to the
Token Ring	TOT, Hard Errors > 0.01 errors/sec	15/60 min	Major
Message:	Too many hard errors		-
Description:	Hard errors are fatal errors that may be recoved hardware failure in the ring. Hard failures in Loss, TR Bit Streaming, and TR Contention	clude: TR Set Recover	
Recommendations:	Drilldown to an AAG report to see the h		
MIB2LAN	TOT, Errors (%) > 5%		
Message:	Too many errors		
Description:	The percentage of frames sent on the LAN with errors is too high.		
Recommendations:	Drilldown to an AAG to diagnose the pr	oblem.	
MIB2LAN	TOT, Discards In % > 1%	15/60 min	Major
Message:	Received Frame discards		
Description:	Too many frames were discarded after they	were received	
	A frame going through a router or switch ge receiving process (frames in), a forwarding p The frame (packet) can be discarded (lost) in	process, and a sending	process (frame out).
Packets lost in sending are generally lost due to queue losses (re too many discards out above). Packets lost in forwarding are generally lost because the destination of the second		•	
	unreachable.		
	Packets lost in receiving (In frames) can be		
	The receive process may not have enough		
	The router or switch may use input quer buffered (queved) in the receiving interference.		
	 buffered (queued) in the receiving interf shared memory where a central met the receiving interface and sending read and write the frames. 	mory is used to hold fr interface access the sh	ames. In this design ared memory to
	 output queueing where the frames a When a router or switch uses input queue input queues in the receiving interface from the control of the con	eing, if an outbound l	ink is too busy, the

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Recommendations:	 Increase the amount of memory (buffers) If the router or switch uses input queuein which (if any) are too busy. If any are, so Check to see if there are any other errors discard frames. 	g, check the output int live that problem.	erfaces to see
MIB2LAN	TOT, Bandwidth Utilization > 100%	15/60 min	Minor
Message:	Speed set too low		
Description:	The bandwidth utilization was measured at over 100%. This is most often caused by the speed being set incorrectly in the poller configuration.		
Recommendations:	 Check the speed of the ring. For example really 16Mbit/sec? 	e, if it is set to 4Mit/sec	e, is the speed

3.3 Token Ring - Unusual Workload Profile

Table 9 Token Ring - Unusual Workload

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Token Ring	(DFM, Broadcasts above 99.9 percentile) AND (TOT, Bandwidth Utilization > 10%)	15/60 min	Warning
Message:	Unusually high broadcasts		
Description:	The number of broadcast frames on the LAN is ur with a test that Bandwidth Utilization is > 10% to small, values. Refer to 12.1.		
Recommendations:	 High broadcasts without high unicasts may p ARP (the address resolution protocol used in packets to locate stations that have a particula forward a packet to that IP address. An unusu frames may indicate problems in ARP. Similarly, any other protocol that uses broads services may be having a problem finding the A new application or protocol may have been uses broadcast frames. 	IP networks) send or IP address, or a nally high number cast frames to loca ose systems or serv	Is broadcast router that can of broadcast te other systems or vices.
Token Ring	(DFM, Multicasts above 99.9 percentile) AND (TOT, Bandwidth Utilization > 10%)	15/60 min	Warning
Message:	Unusually high multicasts		
Description:	The number of multicast frames on the LAN is ur with a test that Bandwidth Utilization is > 10% to small, values. Refer to 12.1.		
Recommendations:	 Multicast frames are used like broadcast frames is or services. Like broadcast frames, they flood through the However, because multicasts are protocol specific protocol receive them and must process them. High multicasts without high unicasts may p A protocol that uses multicast frames to local having a problem finding those systems or set. A new application or protocol may have been uses multicast frames. 	ough the entire ex- c, only hosts partice recede multicast so te other systems of prices.	tended LAN. cipating in the torms. r services may be
Token Ring	(DFM, Unicasts above 99.9 percentile) AND (TOT, Bandwidth Utilization > 10%)	15/60 min	Warning
Message:	Unusually high unicasts		
Description:	The number of unicast frames on the LAN is unu with a test that Bandwidth Utilization is > 10% to small, values.		
Recommendations:	A new application or protocol may have been	n added to the Ext	ended LAN.
MIB2LAN Port	(DFM, Frames In above 99 percentile) AND (TOT, Bandwidth Utilization In > 10%)	15/60 min	Warning
Message:	(DFM, Frames Out above 99 percentile) AND (TOT, Bandwidth Utilization Out > 10%) Unusually high frames in Unusually high frames out		

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Description:	The number of frames on the LAN is unusual that Bandwidth Utilization is > 10% to filter values.		
Recommendations:	A new application or protocol may have	been added to the Ext	tended LAN.
MIB2LAN Port	(DFM, Non-Unicast Frames In above 99 percentile) AND (TOT, Bandwidth Utilization > 10%)	15/60 min on In	Warning
	(DFM, Non-Unicast Frames Out above 99 percentile)) AND (TOT, Bandwidth Utilizat Out > 10%)	ion	
Message:	Unusually high non-unicast frames in Unusually high non-unicast frames out		
Description:	The number of non-unicast frames on the LA with a test that Bandwidth Utilization is > 10 small, values.		
	MIB2LAN elements combine broadcast and non-unicast frames. As described above, broa in protocols to locate systems and services.		
Recommendations:	High broadcasts and multicasts without storms.	ets without high unicasts may precede broadcast	
	 ARP (the address resolution protocol use packets to locate stations that have a par forward a packet to that IP address. An use frames may indicate problems in ARP. 	ticular IP address, or a	a router that can
	 Similarly, any other protocol that uses be other systems or services may be having services. 		
	 A new application or protocol may have uses broadcast or multicast frames. 	been added to the Ex	tended LAN that

4 WAN Profiles

The WAN profiles apply to elements whose types include WAN and Server WAN. Thus this profile can be applied to a LAN/WAN group with the appropriate elements, or a Server group, again based on their interface speeds.

Profiles supported include Delay profiles, Failure profiles, and Unusual Workload profiles.

4.1 WAN – Delay Profiles

Separate WAN Delay profiles are provided for different ranges of link speeds. The following table describes them.

rofile	Supported Speed Links	Link Speed Range
6K profile	low speed links	links with speed 256 ≤ Kbps.
l profile	moderate speed links	links with speeds from 256 Kbps to 3 Mbps.
3 profile	high speed links	links with speed above 3Mbps.
	•	

The main difference between the profiles is in the acceptable bandwidth utilization. Higher speed links can support a higher utilization than lower speed links. This is seen in the threshold used in the over utilized alarms. Otherwise, these profiles are the same, and all are described in Table 10.

Table 10 WAN 56K - Delay, WAN T1 - Delay, and WAN T3 - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
WAN	TOT, Bandwidth Utilization In $> x\%$	15/60 min	Minor
	TOT, Bandwidth Utilization Out $> x\%$		
Message:	Over Utilized In		
	Over Utilized Out		
Description:	The WAN link is carrying too much traffic In link, when a frame arrives that is to be sent on becomes free. Since each frame must wait for serviced, longer queues add more delay to the The faster the link, the higher the utilization thare supplied, 56K, T1, and T3. The 56K profile supports low speed links, link The T1 profile supports moderate speed links, The T3 profile supports high speed links, link	that link, it will be queued in latency of the packet at can be supported. The supported with speed $256 \le K$ links with speed 3 M	the dependence of the speed ranges of the spe
Recommendations:	 Get a faster circuit, for example, upgrade a 128 Kbps ISDN link to a fractional T1 at 256 Kbps. Setup up a parallel circuit, and split the traffic equally between the two circuits. Reroute traffic, if you have a mesh network with redundant paths, you may be able to change the routing to direct some of the traffic to follow an alternate path. Add a direct circuit to divert traffic off this circuit. For example, if the Los Angeles to Chicago circuit is too busy, and a large fraction of the traffic on the circuit is destined for Atlanta, add a direct circuit from Los Angeles to Atlanta to offload that traffic. Prioritize the traffic carried over the circuit, and use traffic shaping and policing to ensure high priority traffic gets through with minimal delay, at the cost of delaying the low priority traffic (or even discarding it). Entire books have been written on network design and redesign. To dig deeper, start with Designing Wide Area Networks and Internetworks: A Practical Perspective.³ 		the two circuits. ths, you may be y an alternate path. e, if the Los he traffic on the geles to Atlanta to ping and policing to the cost of o dig deeper, start
WAN Message: Description:	TOT, Discards Out % > 1% Too many discards out When a queue grows, eventually the router, he hold the queued frames, and any additional frawill be discarded. Discards are normal in IP n designed to drive the bottleneck link to saturate signaled back to the TCP sender as discarded the overall network efficiency, as the discarded	ames that should be setworks because the tion. The resulting co (lost) packets. Too m	ent out the interface TCP protocol is ngestion is then any discards lower

³ Marcus, J. Scott, *Designing Wide Area Networks and Internetworks: A Practical Perspective*, Addison-Wesley, Reading, Mass, 1999, ISBN 0-201-69584-7.

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Recommendations:	 While most discards are due to queueing d may discard packets. Depending on the de may be causing discards. 		
	 If the link is over utilized, deal with it as d Utilized alarms above. Note this may only After increasing the speed, look to see if of many discards or are now over utilized. 	move the bottleneck	to another link.
	 Increase the number of buffers in the output link is not causing delay in the network, but is causing significant delay, adding buffers the discard rate significantly. 	ut is still discarding	packets. If the link
	 Implement RED (Random Early Discards) supported by many routers and switches to the queue fills. This has proven extremely improving overall network performance. I on UDP, or protocols other than TCP/IP p 	signal congestion to effective in lowering However, if most of	o TCP flows before g discards, and the traffic is based

4.2 WAN - Failure Profile

A single WAN failure profile is provided that applies to all WAN elements. It detects outright failures and too many errors, see Table 11.

Table 11 WAN - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
WAN	Availability	30 min	Critical	
Message:	Link Down			
Description:	The link has gone down.			
Recommendations:	 Correct the problem. 			
	 If the link is normally down, you could depolling and alarming on this link. 	lisable polling to stop	EHealth from	
WAN	TOT, Discards In % > 1%	15/60 min	Major	
Message:	Too many discards in			
Description:	Too many frames were discarded after they v	vere received.		
	A frame going through a router or switch get receiving process (frames in), a forwarding p The frame (packet) can be discarded (lost) in	rocess, and a sending	process (frame out).	
	Packets lost in sending are generally lost due too many discards out in Table 10). Packets lost in forwarding are generally lost			
	unreachable.	because the desimation	ii is unknown or	
	Packets lost in receiving (In frames) can be	lost for a variety of rea	sons.	
	The receive process may not have enough	h buffers to hold the i	ncoming frames.	
	 The router or switch may use input queu 			
	buffered (queued) in the receiving interf			
	 shared memory where a central menther receiving interface and sending read and write the frames. 			
	 output queueing where the frames a When a router or switch uses input queue input queues in the receiving interface frames. 	eing, if an outbound l	nk is too busy, the	
Recommendations: • Increase the amount of memory (buffers) allocated to the receiv • If the router or switch uses input queueing, check the output int which (if any) are too busy. If any are, solve that problem.		ving interface.		
	Check to see if there are any error conditor discard frames.		using this interface	
WAN	TOT, Errors % > 1%	15/60 min	Major	
Message:	Too many errors			
Description:	Any frame which cannot be received or sent due to an error is counted here. If too			
	performance will be degraded. Further, man	any frames have errors (as measured as a percentage of total frames), the system formance will be degraded. Further, many errors are indicators of problems		
Recommendations:	may lead to failure of the link, interface, or the kind of errors determine what may be well	rong, eHealth groups	all errors together	
MCCOMMICHUATIONS.	The kind of offorb determine what may be w	B. Oupb		

4.3 WAN - Unusual Workload Profile

A single WAN unusual workload profile applies to all WAN elements. It detects when the workload on a link changes significantly.

This profile works best when applied to WAN links used by many users.

Table 12 WAN - Unusual Workload

Rule, Trend Variable, Threshold	Window	Severity
• (DFM, Frames Out above 99.9 percentile)	15/60 min	Warning
)	
· · ·		
• •		
•	irrent data compai	res to the normal
	. 1 .	1 (1
Drilldown to an AAG report to diagnose the variables for this WAN link.	current values of a	number of key
•	•	ng delay, refer to
If the number of frames is Unusually High In	and Out, and the	Average Frame
frames. This may indicate a protocol problem variable.	n. The Average Fr	ame Size is a trend
 A new application or a new group of users m 	ay now be using t	his link. In these
	15/60 min	Warning
· · · · · · · · · · · · · · · · · · ·	_	
)	
· · · · · · · · · · · · · · · · · · ·		
•		
	In or Out is unus	ually low. The rule
_		
•	urrent data compa	ics to the normal
•	current values of	a number of key
variables for this WAN link.		-
• If the traffic on the link is low during a period when the traffic is expected to be		
		ince and
 If the alarm remains active for a long time, i 		
If the clarm remains active for a large times.	t could mean on a	nnlication or a
	 (DFM, Frames Out above 99.9 percentile) AND (PFM, Frames In above 99.9 percentile) AND (PFM, Frames In 10% above mean) (DFM, Frames In 10% above mean) Unusually High Frames Out Unusually High Frames In The traffic as measured by the number of Frames requires at least a 10% increase in the number of Drilldown to a Trend report to see how the curange. Drilldown to an AAG report to diagnose the variables for this WAN link. If the Utilization In or Out is high, the WAN the discussion in Table 10 for recommendation. If the number of frames is Unusually High In Size is small, the WAN link may be carrying frames. This may indicate a protocol problem variable. A new application or a new group of users make a larm should remain active for a low of the companies. (DFM, Frames Out below 99.9 percentile) AND (PFM, Frames In 10% below mean) (DFM, Frames In 10% below mean) Unusually Low Frames Out Unusually Low Frames In Unusually Low Frames In The traffic as measured by the number of frames requires at least a 10% increase in the number of Drilldown to a Trend report to see how the curange. Drilldown to an AAG report to diagnose the variables for this WAN link. If the traffic on the link is low during a period very predictable this may indicate a problem every night at midnight, a file is transferred Unusually low frames on the WAN link betwheadquarters may indicate the file transfer face. 	(DFM, Frames Out above 99.9 percentile) AND (PFM, Frames Out 10% above mean) (DFM, Frames In above 99.9 percentile) AND (PFM, Frames In 10% above mean) (DFM, Frames In 10% above mean) Unusually High Frames Out Unusually High Frames In The traffic as measured by the number of Frames In or Out, is unus requires at least a 10% increase in the number of frames/sec. Refer Drilldown to a Trend report to see how the current data comparange. Drilldown to an AAG report to diagnose the current values of a variables for this WAN link. If the Utilization In or Out is high, the WAN link may be causi the discussion in Table 10 for recommendations. If the number of frames is Unusually High In and Out, and the Size is small, the WAN link may be carrying an unusually high frames. This may indicate a protocol problem. The Average Frairable. A new application or a new group of users may now be using the cases, the alarm should remain active for a long time. (DFM, Frames Out below 99.9 percentile) AND (PFM, Frames Out below 99.9 percentile) AND (PFM, Frames In 10% below mean) (DFM, Frames In 10% below mean) Unusually Low Frames Out Unusually Low Frames In The traffic as measured by the number of frames In or Out, is unus requires at least a 10% increase in the number of frames/sec. Refer Drilldown to a Trend report to see how the current data comparange. Drilldown to an AAG report to diagnose the current values of variables for this WAN link. If the traffic on the link is low during a period when the traffic very predictable this may indicate a problem with an applicative every night at midnight, a file is transferred from a branch office Unusually low frames on the WAN link between the branch of headquarters may indicate the file transfer failed.

5 Frame Relay Profiles

Frame Relay Ports are WAN Links and should be monitored with the appropriate WAN profiles. These profiles apply to Frame Relay circuits (DLCIs). Frame Relay circuits should have their speed set to Committed Information Rate (CIR).

Frame Relay circuits are used by enterprises to send data over the long distances (the WAN). They are purchased from a Frame Relay service provider, an organization that builds a Frame Relay network and sells bandwidth in the form of Frame Relay circuits to enterprises. Profiles are provided for the enterprise customer of Frame Relay services and for the service provider.

An enterprise customer of a Frame Relay circuit purchases a physical WAN serial link (often a T1 link) at each router to connect them to the Frame Relay network. These are called *access links*. The customer and the service provider set up a Frame Relay circuit over the two access links. A Frame Relay circuit is identified at each end of a link by a DLCI, a Data Link Circuit Identifier. Each access link can carry multiple Frame Relay circuits. It is very common for a customer of a Frame Relay service to buy a single link to attach a central router or switch located at corporate headquarters to a Frame Relay network. The headquarters access link carries many Frame Relay circuits, each leading to a different remote office.

The service provider provisions the Frame Relay network to connect the two ends of each circuit together. Frame relay circuits often are provisioned through multiple Frame Relay switches and are carried across multiple trunks within the Frame Relay network. The Frame Relay service provider lowers cost by selling the bandwidth of the trunks to carry circuits for many customers. Indeed, the Frame Relay service provider may over subscribe the trunk bandwidth.

Frame relay circuits have a CIR that is less than or equal to the speed of the underlying link to access the Frame Relay network. The CIR is measured in bits per second, and represents the largest average rate at which data is guaranteed to be delivered over the circuit. A user of a Frame Relay circuit can send traffic at a rate faster than CIR, however, the Frame Relay service provider does not guarantee the delivery of that portion of the data "over CIR". Since the cost of a Frame Relay circuit depends on the CIR purchased, some users feel data sent over CIR is "free" bandwidth.

When there is too much traffic through a switch or over a trunk within the Frame Relay network, the trunk or switch can become congested. When a trunk or switch is congested depends on the policies of the Frame Relay service provider and on the capabilities of the underlying switch. Different switches built by different vendors have different policies and techniques for identifying and responding to congestion. Customers of a Frame Relay service will have to contact their service provider for a precise definition of congestion. Because many circuits share trunks and switches, congestion on them can affect all customers, not just the circuits contributing the traffic that causes the congestion. Frame relay circuits are bi-directional (data can be sent in both directions), and the congestion may only affect traffic sent in one direction.

When a Frame Relay network is congested, it may send congestion notifications to the sender and receiver of the traffic. The congestion notification sent back to the sender is called a Backward Explicit Congestion Notification, or BECN. The congestion notification sent with the congested traffic to the receiver is called a Forward Explicit Congestion Notification, or FECN. These terms are defined from the point of view of the Frame Relay switches inside the Frame Relay network. For the customer of a Frame Relay service, receiving a BECN on a Frame Relay circuit indicates that the data that was sent over the circuit encountered congestion. The customer should respond by sending less traffic. Receiving a FECN on a Frame Relay circuit indicates that the data that was received over the circuit encountered congestion. The customer should respond by having the far end of the circuit send less traffic.

⁴ At least that's what the Frame Relay specifications and the network service provider would like the user to do. But few routers or switches change their behavior in response to FECNs or BECNs.

One way a Frame Relay network can respond to congestion is to discard frames. One way to control which frames are discarded is to discard frames with the Discard Eligible (DE) flag set. The discard eligible flag can be set in two ways. The customer of the Frame Relay service could flag certain frames as discard eligible. The customer could flag frames over CIR as discard eligible, or the customer could prioritize traffic based on type, and flag lower priority traffic as discard eligible. Frame relay service providers can also flag frames as being discard eligible. Most often, this is done by the first Frame Relay switch inside the frame network receiving the traffic — that is, the Frame Relay access switch where the access link from the customer terminates. If this access switch receives data at a rate over CIR from the customer it can respond in a number of ways:

- 1. It can simply let the frames into the network and do nothing.
- 2. It can flag some of the frames as discard eligible. This is known as traffic marking.
- 3. It can buffer (delay) frames, lowering the rate they are introduced into the network to lower the data rate to CIR. This is known as *traffic shaping*.
- 4. It can simply decide to discard enough frames to lower the data rate to CIR. This is known as *traffic policing*. Traffic marking, shaping, or policing can be applied anywhere within the Frame Relay network.

5.1 Frame Relay for the Enterprise Profiles

Two profiles are provided for Frame Relay customers:

- Frame Relay for the Enterprise Delay, see Table 13.
- Frame Relay for the Enterprise Failure, see Table 14.

Table 13 Frame Relay for the Enterprise - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Frame Relay	TOT, Bandwidth Utilization In > 150%	15/60 min	Warning
	TOT, Bandwidth Utilization Out > 150%		
Message:	Over CIR in		
	Over CIR out		
Description:	This alarm indicates that the circuit is sending (o	out) or receiving (in) traffic
	significantly over CIR.		
Recommendations:	While traffic over CIR is not itself a problem, it	may lead to increas	ed delay in the
	Frame Relay network due to congestion within the	he Frame Relay net	work or because
	the Frame Relay network loses data. This alarm	warns that data is a	t risk. The steps
	you can take to lower the bandwidth utilization a	re much the same a	s for any WAN
	link:		•
	 Increase the CIR of the circuit. 		
	Reroute traffic. If you have a mesh network	with redundant pat	hs, you may be
	able to change the routing to direct some of		
	Add a direct circuit to a divert traffic off this		
	Angeles to Chicago circuit is too busy, and		
	circuit is destined for Atlanta, add a direct c		
	offload that traffic.	nean nem Bes i an	Solop to Titlania to
	Prioritize the traffic carried over the circuit,	and use traffic shar	ning and policing to
	ensure high priority traffic gets through with		
	delaying the low priority traffic (or even dis		the cost of
	Entire books have been written on network design		dia deener start
	with Scott Marcus' book "Designing Wide Area		
	with book intaious book Designing wide Area	iverworks und inter	HELINUING .

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Element Type	Rule, Trend Variable, Threshold	Window	Severity
Frame Relay	TOT, BECN In % > 2%	15/60 min	Minor
Message:	Congestion in network on outbound data sent	t	
Description:	The Frame Relay network is indicating that it is congested on the data being sent by this host over the circuit to the other end.		
Recommendations:	 If this alarm persists without one of the two outbound data sent under CIR or Congestio being raised, then the traffic is encountering traffic loads near CIR. Refer to section 5.2 actions to take. 	n in outbound data goongestion, when	sent over CIR) it is sustaining

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Frame Relay	TOT, BECN In % > 2% AND	15/60 min	Minor	
	TOT, Bandwidth Utilization Out > 150%			
Message:	Congestion in network on outbound data sent over CIR			
Description:	The Frame Relay network is indicating that it is congested on the data being sent by			
_	this host over the circuit to the other end, and	when it is congested,	the circuit is	
	carrying traffic significantly above CIR.			
Recommendations:	 Refer to the general discussion of Frame I 	Relay congestion in se	ection 5.2 for a	
	description of recommended actions to tal	ke.		
Frame Relay	TOT, BECN In % > 2% AND	15/60 min	Minor	
	TOT, Bandwidth Utilization Out < 50%			
Message:	Congestion in network on outbound data se			
Description:	The Frame Relay network is indicating that it			
	this host over the circuit to the other end, and	when it is congested,	the circuit is	
	carrying traffic significantly below CIR.			
Recommendations:	 Refer to the general discussion of Frame ! 		ection 5.2 for a	
	description of recommended actions to tal	ke.		
Frame Relay	TOT, FECN In % > 2%	15/60 min	Minor	
Message:	Congestion in network on inbound data rec			
Description:	The Frame Relay network is signaling that the			
	encountered congestion as it passed through the network from the sender.			
Recommendations:	 If this alarm persists without one of the tw 			
	inbound data received under CIR or over CIR) being raised, then the traffic is			
	encountering congestion, when it is sustaining traffic loads near CIR. Refer to the			
	discussion in section 5.2 for a description	of recommended acti	ons to take.	
Frame Relay	TOT, FECN In % > 2% AND	15/60 min	Minor	
	TOT, Bandwidth Utilization In > 150%			
Message:	Congestion in network on inbound data rec			
Description:	The Frame Relay network is signaling that the			
	encountered congestion as it passed through the network from the sender, and when			
	the congestion was seen, the circuit was receiving traffic significantly above CIR.			
Recommendations:	Refer to the general discussion of Frame		ection 5.2 for a	
	description of recommended actions to ta	ke.		
Frame Relay	TOT, FECN In % > 2% AND	15/60 min	Minor	
	TOT, Bandwidth Utilization In < 50%			
Message:	Congestion in network on inbound data rec			
Description:	The Frame Relay network is signaling that the traffic received on the circuit			
	encountered congestion as it passed through the		ender, and when	
	the congestion was seen, the traffic was significantly below CIR.			
Recommendations:	 Refer to the general discussion of Frame 		ection 5.2 for a	
	description of recommended actions to take.			

Table 14 Frame Relay for the Enterprise - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Frame Relay	Availability	30 min	Critical	
Message:	Frame Relay Circuit Down			
Description:	The Frame Relay circuit is down.			
Recommendations:	 Check if the underlying WAN port acces 	s link is down.		
	• Check to see if the far end router or WAN port access link is down.			
	 Check to see if the Frame Relay circuit h either end. 	•		
	 If none of the above are true, then check see if there is a problem within their netv 	•	service provider to	
Frame Relay	TOT, Errors % > 0.5%	15/60 min	Minor	
Message:	Too many errors			
Description:	The Frame Relay circuit has encountered errors. Most errors occur when a frame is being sent or received over the Frame Relay circuit. Errors when a frame is sent often occur because of problems within the sending interface. Errors when a frame is received could indicate problems in the receiving interface, or it could represent CRC errors where the frame is corrupted within the Frame Relay network.			
Recommendations:	Determine the kinds of errors the circuit is experiencing and correct them.			

5.2 Diagnosing Congestion Problems in Frame Relay Circuits

Congestion problems in Frame Relay circuits can be difficult to diagnose. When an alarm indicates that a circuit is congested, there are a number of things to check:

- Which direction is encountering congestion? The profile distinguishes between congestion encountered in each direction.
- 2. What traffic (bandwidth utilization) is the circuit carrying when the congestion is encountered? This profile identifies three cases: when traffic is over CIR or under CIR when congestion occurs, and when neither are true, meaning traffic roughly equals CIR when congestion occurs.
- 3. Where is the congestion occurring? At the sending access link, at the receiving access link, or internally within the network.
 - a) You can identify if an access link is over utilized by examining the bandwidth utilization in and the bandwidth utilization out of the WAN port.

For example, say a circuit carrying traffic from Atlanta to Boston is showing alarms at each end. You see Congestion in network on outbound data sent at the Atlanta end of the circuit, and Congestion in network on inbound data received at the Boston end of the circuit. These alarms are consistent, and indicate congestion in the traffic sent from Atlanta to Boston.

The circuit has a CIR of 128 Kbit/sec, and the access lines in both ends are T1 (1.544 Mbit/sec) links. While the Atlanta Access link carries only the single circuit, the Boston access link carries 10 circuits.

The Atlanta-Boston circuit is carrying about 140 Kbit/sec of traffic from Atlanta to Boston. The Bandwidth Utilization Out measured at Atlanta is only 9% of the port's speed. Clearly, the access port out of Atlanta is not the source of the congestion.

However the circuit has a Bandwidth Utilization of about 110%, which means the circuit is being given traffic slightly above CIR. This could be why the network is indicating congestion.

The Bandwidth Utilization In on the Frame Relay circuit at Boston is also about 110% (140 Kbit/sec). So we aren't losing much of the traffic.

But the total Bandwidth Utilization In of the T1 port in Boston for the access link carries about 1.250 Mbit/sec traffic for 10 Frame Relay circuits, and its Bandwidth Utilization In is about 81%. This link may well be the source of the congestion. The traffic may getting through the Frame Relay network, only to encounter congestion at the outbound access link. The three Delay – WAN profiles for 56K, T1, and T3 will raise an alarm when the access port is over utilized, and will distinguish between inbound and outbound directions.

With answers to those three questions, here are recommended actions for many of the cases.

- 1. If either access link is over utilized, then fix the over utilization as described in section 4.1 and Table 10.
- 2. If neither access link is over utilized, and the traffic on the Frame Relay circuit is significantly less than CIR, then the congestion may be within the network, and not directly caused by your traffic.
 - a) Check with your network service provider to see if there is a congestion problem within the network.
- 3. If the traffic is significantly greater than CIR, then the congestion may be specific to this circuit.
 - a) Increase the CIR of this circuit. A Trend report of bandwidth utilization should show how much bandwidth (CIR) is needed.
 - b) Reroute traffic off from this circuit. If you have a mesh network with redundant paths, you may be able to change the routing to direct some of the traffic to follow an alternate path.
 - c) Add a direct circuit to divert traffic off this circuit. For example, if the Los Angeles to Chicago circuit is too busy, and a large fraction of the traffic on the circuit is destined for Atlanta, add a direct circuit from Los Angeles to Atlanta to offload that traffic.
 - d) If you have installed at probe at either end of the circuit, use Traffic Accountant reports to determine which application, and nodes are using the circuit most.
 - e) Prioritize the traffic carried over the circuit, and use traffic shaping or policing to ensure high priority traffic gets through with minimal delay, at the cost of delaying the low priority traffic (or even discarding it).
 - f) Add another circuit to carry the different traffic flows.
- 4. If the traffic roughly equals CIR (that is neither case 2 nor case 3 are true) then any of the above actions may help.

5.3 Frame Relay for the Service Provider Profiles

The Frame Relay service provider must balance the requirements of many customers and ensure that all customers receive the service levels for which they contract. While the service provider has more tools at its disposal to measure and control delay and failures; the errors, discards, and latency introduced by each Frame Relay switch accumulate for all the switches through which a circuit passes. The service provider profiles account for this by using slightly lower thresholds than the enterprise profiles.

The two service provider profiles are:

- Frame Relay for the Service Provider Delay, see Table 15.
- Frame Relay for the Service Provider Failure, see Table 16.

Table 15 Frame Relay for the Service Providers – Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Frame Relay	TOT, Bandwidth Utilization In > 150% TOT, Bandwidth Utilization Out > 150%	15/60 min	Minor	
Message:	Over utilized in Over utilized out			
Description:	The traffic on this circuit is well over Committed Information Rate (CIR), either inbound or outbound to the frame relay switch.			
Recommendations:	 If this circuit is an access circuit, then Over Utilized In indicates the traffic receive while Over Utilized Out indicates the traffic sent If the traffic is consistently over CIR, the confidence of the circuit. For Over Utilized In on an access circuit, contraffic shaping to control the overload. 	to the customer is or ustomer may wish to	ver CIR.	
Frame Relay	TOT, BECN In % > 2%	15/60 min	Minor	
Message: Description:	Backward congestion received from downstream The switch has received backward congestion indications (BECNs) from the downstream switch. These BECNs will be sent back upstream to the next switch closer to the sender.			
Recommendations:	 If this is an internal trunk, one of the switches downstream (towards the receiver of the data) is congested. If this is a NNI (Network Network Interface) connection to another Frame Relay network, then the congestion is in the network on the other side of the NNI. Forward the problem to the other network provider for resolution. 			
Frame Relay Message: Description:	TOT, BECN Out % > 2% 15/60 min Minor Backward congestion sent upstream to sender The switch has sent BECNs, backward congestion indications, upstream on this circuit, towards the sender of the data that is congested. The BECNs sent combine both BECNs received from downstream and any congestion indications generated within this switch.			
Recommendations:	 Determine if the BECNs are internally generated or simply passed on by this switch. Examine the BECNs received on the circuit this circuit is cross connected to within the switch. If they are comparable to the BECNs Out on this circuit, then trace the circuit downstream to find out where the congestion is occurring. If the BECNs Out on this circuit are more than the BECNs received on the cross-connect circuit, then there is congested vary with different switch manufacturers using different rules. Examine the outbound utilization of the port carrying the circuit to which this circuit is cross-connected. If the outbound utilization of that port is high, then the queues will grow, and all the traffic carried on that network interface will be delayed and congested. The port should be showing alarms. Most of the circuits carried over this port should also show alarms as well. 			
Frame Relay Message:	TOT, FECN In % > 2% Forward congestion received from upstrean	15/60 min	Minor	

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Description:	The switch has received congestion indication. This indicates that the traffic was congested FECNs will be passed on downstream.			
Recommendations:	 If this network interface is an NNI, an interface to another network, the congestive was within that other network. Forward the problem to the other network for resolution. If the interface is an internal trunk, then trace the circuit back upstream to find the source of the congestion. 			
Frame Relay	TOT, FECN Out % > 2%	15/60 min	Minor	
Message:	Forward congestion sent downstream to r			
Description:	The switch has sent FECNs downstream to to congestion. The FECNs sent combine the FE locally generated within the switch.			
Recommendations:	 Determine if the FECNs are internally g switch. 	• • •	•	
	 Examine the FECNs received on the circuit within the switch. 			
	If they are comparable to the FECNs Out			
	upstream to the next switch to find out v	-	-	
	 If the FECNs Out on this circuit are more connect circuit, then the congestion is w 			
	determining when a circuit is congested			
	using different rules.	•		
	 Examine the outbound utilization of the utilization of that port is high, then the on that network interface will be delayer showing alarms. Most of the circuits car alarms as well. 	queues will grow, and a d and congested. The p	ll the traffic carried ort should be	
Frame Relay	TOT, Discards % > 1%	15/60 min	Minor	
Message:	Too many discards	D -1 24 -1 211	. C1 CC .	
Description:	When a queue grows, eventually the Frame Relay switch will run out of buffers hold the queued frames, and any additional frames that should be sent out the in will be discarded. Discards are normal in IP networks because the TCP protoco designed to drive the bottleneck link to saturation. The resulting congestion is t signaled back to the TCP sender as discarded (lost) packets. Too many discards the overall network efficiency, as the discarded packets must be resent.			
Recommendations:	While most discards are due to queueing dis-	cards, there are other re	easons a Frame	
	Relay switch may discard packets. Depending on the switch, see if any of these other			
	reasons may be causing discards:	. 4 9 . 4 . 1	_,11.'	
	 If the link is over utilized, deal with it a move the bottleneck to another link. Aft other links in the path are now seeing to 	er increasing the speed	l, look to see if	
	 Increase the number of buffers in the oulink is not causing delay in the network, is causing significant delay, adding buffethe discard rate significantly. 	tput queue. This is only but is still discarding	y appropriate if the packets. If the link	

Table 16 Frame Relay for the Service Provider - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Frame Relay	Availability	30 min	Critical
Message:	Frame Relay Circuit Down		
Description:	The Frame Relay circuit is down.		
Recommendations:	 Check to see if the WAN port carrying the 	Frame Relay circuit	is down.
	 Check to see if the adjacent switch or the WAN port on the other end of the link is down. Tracing the circuit, see if any other switch or link is down. Check to see if either customer router or LAN switch is down, or if either access link is down. If the circuit will be down for an extended period, you could temporarily turn off polling for the circuit. 		
Frame Relay	TOT, Errors % > 0.5%	15/60 min	Minor
Message:	Too many errors		
Description:	The Frame Relay circuit has encountered errors. Most errors occur when a frame is being sent or received over the Frame Relay circuit. Errors when a frame is sent often occur because of problems within the sending interface. Errors when a frame is received could indicate problems in the receiving interface, or it could represent CRC errors where the frame is corrupted on the link.		
Recommendations:	 Determine the kinds of errors the circuit is 	s experiencing, and c	orrect them.

5.4 Frame Relay - Unusual Workload Profiles

Table 17 Frame Relay - Unusual Workload

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Frame Relay	DFM, Frames Out (/sec) above 99.9 percentile DFM, Frames In (/sec) above 99.9 percentile	15/60 min	Warning
Message:	Unusually High Frames Out Unusually High Frames In		
Description:	The traffic as measured by the number of Frames	In or Out is unusu	ıally high.
Recommendations:	 Drilldown to a Trend report to see how the curange. Drilldown to an AAG report to diagnose the curaibles for this WAN link. If the Utilization In or Out is high, the WAN the discussion in Table 10 for recommendation. If the number of frames is unusually high In a is small, the WAN link may be carrying an unframes. This may indicate a protocol problem variable. 	current values of a link may be causions. and Out, and the a nusually high num	a number of key ing delay. Refer to Average Frame Size nber of control
	 A new application or a new group of users made cases, the alarm should remain active for a lo 		his link. In these

6 ATM Profiles

ATM services can be used to provide a WAN link between routers or switches in different sites. ATM can also be used within a campus to connect LANs together. When ATM is used for WAN links, an Enterprise that uses the service buys the service (the link) from an ATM service provider. ATM profiles are provided for both the Enterprises who use the ATM service, and the ATM Service Provider. The Service Provider profile could be used at the provider's edge ATM switch where the traffic is initially received and policed, or inside the core of the network to monitor ports for excessive causes of delay (over utilized links, traffic out of spec, too many discards, etc.).

When ATM is used within a campus, the Enterprise purchases and manages their own ATM switches.

6.1 ATM for the Enterprise Profiles

Three profiles are provided for Enterprise customers; they apply to routers or switches that access an ATM service network. These profiles are also appropriate for LAN switches or routers connected to campus ATM switches.

- ATM for the Enterprise T1 Delay, see Table 18, is appropriate for T1/E1 links, and the paths and channels they carry.
- ATM for the Enterprise T3 Delay, see Table 18, is appropriate for T3 or faster links, and the paths and channels they carry.
- ATM for the Enterprise Failure, see Table 19, is appropriate for all ATM ports, paths, and channels.

Table 18 ATM for the Enterprise T1 – Delay, ATM for the Enterprise T3 – Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
ATM Port	TOT, Bandwidth Utilization In $> x\%$	15/60 min	Minor
	TOT, Bandwidth Utilization Out $> x\%$		
Message:	Over Utilized In		
	Over Utilized Out		
Description:	The ATM Port is carrying too much traffic In o	or Out. As traffic buil	lds on an outbound
Recommendations:	 The ATM Port is carrying too much traffic In or Out. As traffic builds on an outbound link, when a frame arrives that is to be sent on that link, it will be queued until the link becomes free. Since each frame must wait for the frames queued in front of it to be serviced, longer queues add more delay to the latency of the packet. The faster the link, the higher the utilization that can be supported. Profiles for two speed ranges are supplied, T1 and T3. The T1 profile supports T1/E1 ATM ports and the paths and circuits they carry. I.e., ports whose speed is 1.544 Mbps or 2.048 Mbps. Here x = 75%. The T3 profile is for T3/E3, and higher speed ports like OC3, OC12, and beyond and the paths and circuits they carry, here x = 90%. Get a faster port, for example, upgrade a T1 to a T3. Setup up a parallel circuit, and split the traffic equally between the two circuits. Reroute traffic, if you have a mesh network with redundant paths, you may be able to change the routing to direct some of the traffic to follow an alternate path. Add a direct circuit to a divert traffic off this circuit. For example, if the Los Angeles to Chicago circuit is too busy, and a large fraction of the traffic on the circuit is destined for Atlanta, add a direct circuit from Los Angeles to Atlanta to offload that traffic. Prioritize the traffic carried over the circuit, and use traffic shaping and policing to ensure high priority traffic gets through with minimal delay, at the cost of delaying the low priority traffic (or even discarding it). 		
ATM Port	with Scott Marcus' book "Designing Wide Area TOT, Discarded Cells Out % > 0.5%	15/60 min	Warning
Message:	Too many discarded cells out		
Description:	When a queue grows, eventually the router, how hold the queued cells, and any additional cells be discarded.	st, or switch will run that should be sent or	out of buffers to ut the interface will
	Discards are normal in IP networks because the bottleneck link to saturation. The resulting consender as discarded (lost) packets. Too many defficiency, as the discarded packets must be resulted at a loss of a single cell means the whole fram ATM networks carrying other kinds of data (V be more or less sensitive to discarded cells. For discards, as an occasional lost cell can be tolerated.	gestion is then signal scards lower the over ent. For ATM netwo e is lost. oice, Video, Switche example, Voice is lo	led back to the TCP erall network orks carrying IP

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Recommendations:	 While most discards are due to queueing discards, there are other reasons a router or switch may discard cells. Depending on the device, see if any of these other reasons may be causing discards: If the link is over utilized, deal with it as described above in the Over Utilized alarm. Note this may only move the bottleneck to another link. If the speed is increased, look to see if other links in the path are now seeing too many discards or are now over utilized. Increase the number of buffers in the output queue. This is only appropriate if the link is not causing delay in the network, but is still discarding packets. If the link is causing significant delay, adding buffers can make it worse, without decreasing the discard rate significantly. 			
ATM Port	TOT, CLP1 Cells In % > 10%	15/60 min	Warning	
Message: Description:	TOT, CLP1 Cells In % > 10% Too many CLP1 cells in ATM networks can mark cells based on their priority, the cell's priority is in the CLP (Cell Loss Priority) field, a single bit. If the CLP bit is 0, the cell has higher priority than cells where the CLP bit is 1. Cells with CLP = 1 should be discarded in preference to cells with CLP = 0. The ATM network can mark cells with CLP = 1 when they violate the traffic policies of the network, or when the ATM network is congested.			
Recommendations:	 Determine where the cells are being market Is this ATM port's Bandwidth Utilizati may be indicating congestion on its end Is one or more of the ATM circuits care For example, an ATM circuit has been service. But the circuit is actually being router or switch is treating the circuit at Then it is likely the traffic will violate mark the offending cells with CLP = 1 cells. Is there congestion inside the ATM net this port likely share bandwidth with on network. If the aggregate traffic from the link's bandwidth, you may see it as cell 	on In too high? If it is, if of the ATM link. ried by this port violating purchased with a CBR gused for data traffic and is a UBR (Unspecified If the traffic policy, and the traffic policy policy.	ng its traffic policy? (Constant Bit Rate) dd the sending Bit Rate) circuit. he network may 1 see the CLP = 1 hts coming in over side the ATM link overuse the	
ATM Channel Message:	TOT, Bandwidth Utilization Out > 100% TOT, Bandwidth Utilization In > 100% Traffic in over SCR	15/60 min	Warning	
Description:	Traffic out over SCR When an Enterprise customer of an ATM service buys a channel from a service provider, they may purchase a particular capacity in terms of the Sustainable or SCR. This is the maximum bit rate that a user can offer to the service over period and have all of the cells carried. It is generally less than or equal to Pe Rate, which is the maximum rate at which cells can be offered for a short per still be carried. eHealth attempts to determine the SCR when the channel is d and sets the speed to the SCR (as measured in bits/sec). This alarm is raised when the traffic in or out an ATM channel is above the SCR more than 15 minutes out of the past hour. When the traffic is above the SCR ATM service may discard or delay cells.			

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Recommendations:	Check to see if the speed is correctly set	to the SCR of the circ	uit. If the SCR is
	higher (or lower), correct the speed in th		
	 Purchase an increased SCR from the AT 	M service provider.	
	 Reroute traffic. If you have a mesh network 		
	able to change the routing to direct some		_
	 Add a direct circuit to a divert traffic off 		
	Angeles to Chicago circuit is too busy, a		
•	circuit is destined for Atlanta, add a dire	ct circuit from Los Ar	igeles to Atlanta to
	offload that traffic.		
	Prioritize the traffic carried over the circ		
	ensure high priority traffic gets through		t the cost of
	delaying the low priority traffic (or even Entire books have been written on network d		a dia daanar start
	with Designing Wide Area Networks and Int		
ATM Channel	TOT, AAL5 PDUs Discarded % > 1%	15/60 min	Warning
Message:	Too many AAL5 frames discarded	15,00 11111	,, unining
Description:	ATM Channels used to carry IP traffic or to	carry frames between	LAN switches in a
Description.	campus, often carry those frames using AAL5. Since frames are larger than cells,		
	AAL5 fragments a frame into multiple cells. The loss of any of those cells causes the		
	entire frame to be discarded. It may be discar	rded at the ATM swite	ch or ATM access
	device (the router or switch that connects to	the ATM service).	
	If a cell is lost due to an error, the entire AA	L5 frame will be disca	arded if the ATM
	switch implements Partial Packet Discard (P		
	traffic policing actions causing cells to be dis		
	following cells in that frameif the switch imp	olements Early Packet	Discard (EPD).
Recommendations:	Determine why cells are being discarded	I, and correct that pro	blem. Note that a
	few cells discarded (1 in 1000) could ea		
	frame is fragmented into 20 cells.		
	 While most discards are due to queueing 		
	may discard cells. Depending on the de	vice, see if any of thes	e other reasons may
	be causing discards.		
	If the link is over utilized, deal with it a		
	utilized alarm above. Note this may onl		
	After increasing the speed, look to see it many discards or are now over utilized.		ii are now seeing too
			ly appropriate if the
	 Increase the number of buffers in the outlink is not causing delay in the network. 		
	is causing significant delay, adding buff		
	the discard rate significantly.		,

Table 19 ATM for the Enterprise – Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
ATM Port	Availability	30 min	Critical
Message:	ATM Port Down		
Description:	The ATM Port is down.		
Recommendations:	 Check to see if the problem is with this end 	d of the link, or the o	ther end.
ATM Port	TOT, Errored Seconds > 5 sec	15/60 min	Minor
Message:	Too many seconds with errors		
Description:	The ATM port measures the number of seconds that have had errors in them. This		
_	alarm is raised if more than 5 seconds out of a		
	errors, and the poll periods total more than 15 i	minutes out of the pa	st hour.
Recommendations:	 Determine the kinds of errors included in t supported by the switch. Correct those pro 		
ATM Port	TOT, Severely Errored Seconds > 0 sec	15/60 min	Major
Message:	Too many seconds with severe errors		
Description:	The ATM port measures the number of second		
	is a standard definition of severely errored second	onds for SONET/SDI	H and DS1/DS3
	physical links.		
Recommendations:	 Any severely errored seconds are a serious 	problem, and can le	ad to lost
	connections and link down.		
ATM Port	TOT, Unavailable Seconds > 0 sec	5/60 min	Critical
Message:	Too many unavailable seconds		
Description:	An unavailable second is a second where the link is unusable.		
Recommendations:	 An unavailable second without the link go problem on the link that should be correct. 		n intermittent
ATM Path	Availability	30 min	Critical
Message:	ATM Path down		
Description:	The ATM path is down. Since paths can carry the failure of a number of channels.	multiple channels, th	nis could indicate
Recommendations:	Determine if the ATM port carrying the part	ath is down.	
	 See if the far end of the circuit is down. 		
	 Check to see if there is a problem within t 	he ATM network.	
ATM Channel	Availability	30 min	Critical
Message:	ATM Channel Down		
Description:	An ATM cannel is down.		
Recommendations:	 Check to see if the underlying port or path 	n is down.	
	 See if the far end of the circuit is down. 		
	 Check to see if there is a problem within t 	he ATM network.	

6.2 ATM Service Provider Profiles

Three profiles are provided for ATM service providers; they apply to the ATM ports, paths and channels on the ATM switches in the network.

- ATM for the Service Provider T1 Delay, Table 20, is appropriate for T1/E1 links, and the paths and channels they carry.
- ATM for the Service Provider T3 Delay, Table 20, is appropriate for T3 or faster links, and the paths and channels they carry.
- ATM for the Service Provider Failure, Table 21, is appropriate for all ATM ports, paths, and channels.

Table 20 Delay – ATM for the Service Provider T1 Delay – ATM for the Service Provider T3

Element Type	Rule, Trend Variable, Threshold	Window	Severity
ATM Port	TOT, Bandwidth Utilization Out $> x \%$	15/60 min	Minor
	TOT, Bandwidth Utilization In $> x$ %		
Message:	Over utilized out		
	Over utilized in		
Description:			
Recommendations:	•		
ATM Port	TOT, Discarded Cells Out % > 0.5%	15/60 min	Minor
	TOT, Discarded Cells In % > 0.5%		
Message:	Too many discarded cells out		
	Too many discarded cells in		
Description:			
Recommendations:	•		
ATM Port	TOT, CLP1 Cells Out (%) > 10%	15/60 min	Minor
	TOT, CLP1 Cells In (%) > 10%		
Message:	Too many CLP1 frames out		
	Too many CLP1 frames in		
Description:			
Recommendations:	•	, · · · · · · · · · · · · · · · · · · ·	
ATM Port	TOT, CLP0 Discards Out % > 0.1%	15/60 min	Minor
Message:	Too many CLP0 frames discarded		
Description:			
Recommendations:	•		
ATM Port	TOT, Policy Violations In % > 10%	15/60 min	Minor
	TOT, Policy Violations Out % > 10%		
Message:	Too many policy violations in		
	Too many policy violations out		
Description:			
Recommendations:	•		
ATM Path	TOT, Bandwidth Utilization Out > 100%	15/60 min	Minor
	TOT, Bandwidth Utilization In > 100%		
Message:	Over utilized out		
	Over utilized in		
Description:			
Recommendations:	•		·
ATM Path	TOT, CLP1 Cells % > 10%	15/60 min	Minor
Message:	Too many CLP1 frames		
Description:			
Recommendations:	•		
ATM Path	TOT, Discarded Cells In % > 0.5%	15/60 min	Minor
Message:	Too many discarded cells out ⁵		
Description:			
Recommendations:	•		
ATM Path	TOT, CLP0 Discards % > 0.1%	15/60 min	Minor
Message:	Too many CLP0 frames discarded		
Description:			
Recommendations:	•		

⁵ Probable bug, message is "out" variable is "in", something is messed up.

Element Type	Rule, Trend Variable, Threshold	Window	Severity
ATM Channel	TOT, Bandwidth Utilization Out > 100%	15/60 min	Minor
	TOT, Bandwidth Utilization In > 100%		
Message:	Traffic out over SCR		
_	Traffic in over SCR		
Description:			
Recommendations:	•		
ATM Channel	TOT, Discarded Cells Out % > 0.5%	15/60 min	Minor
	TOT, Discarded Cells In % > 0.5%		
Message:	Too many discarded cells out		
	Too many discarded cells in		
Description:			
Recommendations:	•		
ATM Channel	TOT, CLP1 Cells In (%) > 10%	15/60 min	Minor
Message:	Too many CLP1 frames in		
Description:			
Recommendations:	•		
ATM Channel	TOT, CLP0 Discards Out % > 0.1%	15/60 min	Minor
Message:	Too many CLP0 frames discarded		
Description:			
Recommendations:	•		

Table 21 ATM for the Service Provider - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
ATM Port	Availability	30 min	Critical
Message:	ATM Port Down		
Description:	The ATM Port is down.		
Recommendations:	 Check to see if the problem is with this end 	of the link, or the o	ther end.
ATM Port	TOT, Errored Seconds > 5 sec	15/60 min	Minor
Message:	Too many seconds with errors		
Description:	The ATM port measures the number of seconds to		
	alarm is raised if more than 5 seconds out of a po		
	errors, and the poll periods total more than 15 m	inutes out of the par	st hour. This is a
	standard measure of errors on ATM links.		
Recommendations:	 Determine the kinds of errors included in th 		rored seconds
	supported by the switch. Correct those prob		
ATM Port	TOT, Severely Errored Seconds > 0 sec	15/60 min	Major
Message:	Too many seconds with severe errors		
Description:	The ATM port measures the number of seconds	that have been seve	erely errored. There
	is a standard definition of severely errored secon	ds for SONET/SD	H ^o links.
Recommendations:	 Any severely errored seconds are a serious p 	problem, and can le	ad to lost
	connections and link down.		6.11.1
ATM Port	TOT, Unavailable Seconds > 0 sec	5/60 min	Critical
Message:	Too many unavailable seconds		
Description:	An unavailable second is a second where the lin		
Recommendations:	 An unavailable second without the link goin 	•	n intermittent
	problem on the link that should be corrected		0 :: 1
ATM Path	Availability	30 min	Critical
Message:	ATM Path down	12.1. 1	to and dituations.
Description:	The ATM path is down. Since paths can carry m	iultiple channels, tr	ns could indicate
D 1.45 mm	the failure of a number of channels.	L :- J	
Recommendations:	Determine if the ATM port carrying the pat		Critical
ATM Channel	Availability	30 min	Critical
Message:	ATM Channel Down		
Description:	An ATM cannel is down.	a dourm	
Recommendations:	• Check to see if the underlying port or path i	s down.	
See if the far end of the circuit is down.			
Check to see if there is a problem within the ATM network.			

6.3 ATM - Unusual Workload Profiles

The ATM – Unusual Workload profile is appropriate for all kinds of ATM ports, paths, and channels.

⁶ Anyone know if there's a standard definition for severely errored seconds?

Table 22 ATM - Unusual Workload

Element Type	Rule, Trend Variable, Threshold	Window	Severity
ATM Port	 (DFM, Cells In above 99.9 percentile) AND (TOT, Bandwidth In > 25%) (DFM, Cells Out above 99.9 percentile) AND (TOT, Percentilate In > 25%) 	15/60 min	Warning
Message:	(TOT, Bandwidth In > 25%)Unusually high cells in		
	Unusually high cells out		
Description:	The number of cells in or out are unusually high. I utilization on the port is over 25%. Refer to section		nly if the bandwidth
Recommendations:	Drilldown to a Trend report to see how the cur range.		res to the normal
	 Drilldown to an AAG report to diagnose the c variables for this ATM Port. 	urrent values of a	number of key
	• If the Utilization In or Out is high, the Port m	ay be causing del	ay, refer to the
	discussion in Table 18 for the Over Utilized a	larms for recomn	endations.
	 A new application or a new group of users ma 		nis link. In these
	cases, the alarm should remain active for a lor		
ATM Path	• (DFM, Cells In above 99.9 percentile) AND (TOT, Bandwidth In > 25%)	15/60 min	Warning
	• (DFM, Cells Out above 99.9 percentile) AND	ı	
	(TOT, Bandwidth In $> 25\%$)		
Message:	Unusually high cells in		
•	 Unusually high cells out 		
Description:	The number of cells in or out are unusually high.		nly if the bandwidth
	utilization on the path is over 25%. Refer to section		
Recommendations:	 Drilldown to a Trend report to see how the cu 	rrent data compa	res to the normal
	range.	numant nalmas of	a number of least
	 Drilldown to an AAG report to diagnose the ovariables for this ATM Path. 	current values of	a number of key
	• If the Utilization In or Out is high, the Path m	nav be causing de	lay, refer to the
	discussion in Error! Reference source not f	ound. for recomm	nendations.
	 A new application or a new group of users ma cases, the alarm should remain active for a lo 		his link. In these
ATM Channel	• (DFM, Cells In above 99.9 percentile) AND (TOT, Bandwidth In > 25%)	15/60 min	Warning
	• (DFM, Cells Out above 99.9 percentile) ANII (TOT, Bandwidth In > 25%))	
Message:	Unusually high cells in		
	 Unusually high cells out 		
Description:	The number of cells in or out are unusually high. utilization on the channel is over 25%. Refer to see	ection 12.1.	
Recommendations:	 Drilldown to a Trend report to see how the curange. 	rrent data compa	res to the normal
	 Drilldown to an AAG report to diagnose the variables for this ATM Channel. 	current values of	a number of key
	 If the Utilization In or Out is high, the Chand discussion in Error! Reference source not feet 		
	 A new application or a new group of users m 		
	these cases, the alarm should remain active for		uns Chamiel. III
	these cases, the alarm should remain active it	or a rong time.	·····

Element Type	Rule, Trend Variable, Threshold	Window	Severity
ATM Channel	• (DFM, AAL5 PDUs In above 99.9 percentile) AND (TOT, Bandwidth In > 25%)	15/60 min	Warning
	• (DFM, AAL5 PDUs Out above 99.9 percentile) AND (TOT, Bandwidth In > 25%)		
Message:	 Unusually high AAL5 PDUs in 		
_	 Unusually high AAL5 PDUs out 		
Description:	The number of AAL5 PDUs in or out are unusually high. The rule alarms only if the bandwidth utilization on the channel is over 25%. Refer to section 12.1.		
Recommendations:	 Drilldown to a Trend report to see how the currenge. 	rent data compa	res to the normal
	 Drilldown to an AAG report to diagnose the covariables for this ATM Channel. 	arrent values of	a number of key
	 If the Utilization In or Out is high, the Channe discussion in Error! Reference source not for 	und. for recomn	nendations.
	 A new application or a new group of users may these cases, the alarm should remain active for 	y now be using t a long time.	his channel. In

7 Router and Switch Profiles

Three profiles are provided for routers and switches. All three apply to any kind of router or switch:

- Router or Switch Delay, see Table 23
- Router or Switch Failure, see Table 24
- Router or Switch Unusual Workload, see Table 25

7.1 Router or Switch - Delay Profile

Table 23 Router or Switch - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Router,	TOT, Average Line Utilization > 70%	15/60 min	Major
Router with CPU			•
Message:	Interfaces too busy		
Description:	The interfaces on this router are, in aggregate, to measured by summing the Bandwidth Utilization router, and dividing by the number of polled into the property of the proper	on of each polled into	
	If the router or switch has interfaces of widely different speeds this alarm we problems where the slow speed links are too busy. For example, an Etherne interface with a utilization of 2% and a 56K WAN link with a utilization of Router will have an average interface utilization of only 46%. To detect prothe low speed links, the interfaces should be discovered as LAN/WAN interinterfaces should be placed in the appropriate groups, and the groups should monitored with the appropriate profiles.		
Recommendations:	 The interfaces on this router are seriously of should be upgraded in speed, or the traffic If you are not monitoring the individual in 	on the interfaces sho	ould be reduced.
Router,	TOT, Average Packet Discards > 5%	15/60 min	Major
Router with CPU			·
Message:	Too many discards		
Description:	The router is discarding too many packets. The average packet discards is the sum of		
Recommendations:	 the discards % for the polled interfaces, divided Drilldown to an AAG report for the router if there are related problems. While most discards are due to queueing divided 	or switch to diagnos	e the router and see er reasons a router
	may discard packets. Depending on the demay be causing discards.	vice, see it any of the	ese other reasons
	 If the interfaces are over utilized, deal with Increase the number of buffers in the output router is not causing delay in the network, router is causing significant delay, adding decreasing the discard rate significantly. Implement RED (Random Early Discards) 	at queue. This is only but is still discarding buffers can make it v	y appropriate if the g packets. If the worse, without
	supported by many routers and switches to the queue fills. This has proven extremely improving overall network performance. I on UDP, or protocols other than TCP/IP pro-	signal congestion to effective in lowering However, if most of the	TCP flows before discards, and he traffic is based
Switch Plus Backplane	TOT, Backplane Utilization > 50%	15/60 min	Major
Message:	Backplane over utilized		
Description:	The switch backplane utilization is too high. We switch will delay a packet as it is transferred from interface the frame should be forwarded out. The	om the receiving inte	erface to the
	through which all packets must pass.		
Recommendations:	 Lower the traffic through the switch, either or by cutting the number of users it supported. Upgrade the switch to one with a faster bar 	rts.	around the switch,
	Upgrade the switch to one with a faster back	ekpiane.	

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Router CPU,	TOT, CPU Utilization > 60%	15/60 min	Major
Switch CPU			
Message:	CPU too busy		
Description:	The CPU utilization is too high. When the CPU is too busy, frames may be delayed as the CPU cannot quickly decide how to forward this frame. Other functions performed by the CPU, such as processing routing updates may be delayed as well.		
Recommendations:	 Review the functions being performed in processing that may not be needed? For filtering on each packet? Some routers allow the CPU to be replaced allow additional processors to be added. 	example, is the router particle with a faster process	performing extra
	 Upgrade the router to a newer, faster, ro 	uter.	

7.2 Router or Switch - Failure Profile

Table 24 Router or Switch - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Router,	Availability	30 min	Critical
Router with CPU			
Message:	Router Down		
Description:	The router went down. Note that eHealth ca		
	until it has come back up. Refer to the gene	eral discussion in 12.4 A	vailability and
D 14'	Reachability Alarms for Hosts.		
Recommendations:	•		0 ::: 1
Router,	Reachability	30 min	Critical
Router with CPU	Donton mana akakla		
Message:	Router unreachable	n Nativiauli muahlama ma	u alaa mrawant tha
Description:	The router is unreachable, and may be down		y also prevent the
Recommendations:	poller from reaching the router's IP Address		ling a number of
Recommendations:	Check to see if the device can be reached a single to the device.	ed (for example, by sent	ing a number of
	 pings to the device). Check if other routers between the eHealth console and the router are down. 		
	• If the router is up, and the reachability		
	router. If it is often high, eHealth may be seeing timeouts on the ping.		
	The problem could be that the latency to the router is too high. Fix the property latency models.		
	network latency problem. • The problem could be that the eHealth ping timeout is set to low. Increase the		
	• The problem could be that the eHe ping timeout used by eHealth.	aim ping mileout is set	to low. Increase the
	ping timeout used by cricatur.		
Router,	TOT, Errors In % > 2%	15/60 min	Major
Router, Router with CPU	101, 211010 111 /0 - 2/0	15,00 11111	1.10,01
Message:	Too many errors in		
Description:	The router or switch has too many errors wh	hen it is receiving frame	es.
Recommendations:	Identify which interfaces are having the		
	to the router or switch are being monitored on by eHealth using the appropriate		
	Failure profiles, then a similar alarm should have been raised on the failing		
	interface.		
	 Errors In often include frames that are corrupted in transmission. 		
	 Errors In often include errors encountered within the receiving interface 		
	hardware/software.		
Router,	TOT, Errors Out % > 2%	15/60 min	Major
Router with CPU			
Message:	Too many errors out		
Description:	The router or switch has too many errors when it is sending frames.		
Recommendations:	Identify which interfaces are having the day the second of the seco		
	to the router or switch are being monitored on by EHealth using the appropriate Failure profiles, then a similar alarm should have been raised on the failing		
	interface.	nould have been raised	on the family
	 Errors Out often include errors encoun hardware/software. 	nered within the sending	ginterrace
	nardwaro sortware.		
			· · · · · · · · · · · · · · · · · · ·
Router CPU	TOT, Free Memory < 2000000 bytes	15/60 min	Major
	TOT, Free Memory < 2000000 bytes	15/60 min	Мајог
Router CPU Switch CPU Message:	TOT, Free Memory < 2000000 bytes Free memory too low	15/60 min	Major

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
Recommendations:	Add more memory.			
	 Free reserved memory. 			
Router CPU	PFM, Total Buffers outside 10% from mean	15/60 min	Warning	
Message:	Configuration change - Total Buffers	15/00 11111	waiinig	
Description:	The total number of buffers used to hold fram	es within the router or	switch is often	
Description.	controlled by configuration choices. Thus a ch			
	in the configuration. This may not be a proble		· · · · · · · · · · · · · · · · · ·	
Recommendations:	This alarm is for information only. It may		on change that	
	caused memory related problems in the r		C	
D CDII	TOT Duffor Miggas > 0.01 miggas/gas	15/60 min	Warning	
Router CPU	TOT, Buffer Misses > 0.01 misses/sec Misconfigured buffers - Router buffer miss		waining	
Message: Description:	On Cisco routers and switches, memory buffer		zes to hold	
Description.	different size frames when they are received.			
	received, and all the small buffers are busy, the			
	miss, and use a larger sized buffer to hold the			
Recommendations:	Buffer misses do not cause frames to be of the course frames to be of		e buffers are full.	
	Check for Discards In.	,		
	Buffer misses indicate a small decrease	in efficiency of memor	y usage, and	
	slightly more processing of the frames forwarded.			
	Buffer misses indicate that not enough memory has been allocated to that size			
	buffer pool. Increase the number of buffer	ers allocated to the poo	l.	
Router CPU	TOT, Fan Status > 2.5	1/60 min	Major	
Switch CPU			y	
Message:	Fan Failed			
Description:	The fan in the switch has failed.			
Recommendations:	• Fix or replace the fan.			
Router CPU	TOT, Fan Status > 1.5	30/60 min	Minor	
Switch CPU	·			
Message:	Fan Marginal			
Description:	The fan in the switch is marginal, and is in da	anger of failing.		
Recommendations:	Fix or replace the fan.			
Router CPU	TOT, Power Supply 1 Status > 2.5	1/60 min	Major	
Switch CPU				
Message:	Power Supply 1 Failed	2 11 . 4 . T.C.41. !		
Description:	Power supply #1 in the router or switch has failed. If this is the only power supply, or			
the other one has failed as well, the router will go down when it runs			is out of battery	
Recommendations:	power.			
Router CPU	• Fix or replace the power supply. TOT, Power Supply 1 Status > 1.5	30/60 min	Minor	
Switch CPU	101, 10wel Supply 1 Status > 1.5	50/00 mm	14111101	
Message:	Power Supply 1 Marginal			
Description:	Power supply #1 is marginal.			
Recommendations:	• Fix or replace the power supply.			
Router CPU	TOT, Power Supply 2 Status > 2.5	1/60 min	Major	
Switch CPU	,		J	
Message:	Power Supply 2 Failed			
Description:	Power supply #2 in the router or switch has failed. If this is the only power sup			
the other one has failed as well, the router will go down			ns out of battery	
	power.			
Recommendations:	 Fix or replace the power supply. 			

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Router CPU	TOT, Power Supply 2 Status > 1.5	30/60 min	Minor
Switch CPU			
Message:	Power Supply 2 Marginal		
Description:	Power supply #2 is marginal.		
Recommendations:	 Fix or replace the power supply. 		
Router CPU	TOT, Temperature Status > 2.5	1/60 min	Major
Switch CPU			
Message:	Critical High Temperature		
Description:	The temperature is too high.		
Recommendations:	 Check the air conditioning in the room v 	where the router is locat	ed.
	 Check the fan in the router. 		
	 Lower the temperature. 		
	 If all else fails, shut down the router or s 		
Router CPU	TOT, Temperature Status > 1.5	30/60 min	Minor
Switch CPU			
Message:	Marginal Temperature		
Description:	The temperature is marginal, and may soon b		
Recommendations:	 Check the air conditioning in the room v 	where the router is locate	ted.
	 Check the fan in the router. 		
	Lower the temperature.		
Router CPU	TOT, Topology Changes > 1.5	30/60 min	Major
Switch CPU			
Message:	Bridge (spanning tree) Topology changing	1 17 4571	1
Description:	A change in the topology of the switched/bri		
	change. This bridge or switch has received a spanning tree change announcement from another switch.		
	another switch.		
	When the enonging tree changes, the switch	bridge may have to rela	earn where stations
	When the spanning tree changes, the switch/bridge may have to relearn where stations are located. While this is occurring, the bridge will forward all frames on all interfaces,		
	thus increasing the network traffic. Under so		
	cause frames to be discarded at the switch.	me conditions, spannin	ig tree changes can
Recommendations:		witched I AN too if any	which switch or
Recommendations.	 Check other switches in the extended, switched LAN too if any which switch or bridge has gone down. 		
	 Check the discards to see if the switch d 	iscarded a large number	er of frames as a
	result of the topology change.	iscarded a rarge numo	of frames as a
	 Some topology changes are caused by a 	switch temporarily los	ing
	communications with a neighboring swi		

7.3 Router or Switch - Unusual Workload Profile

Table 25 Router or Switch - Unusual Workload

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Router	(DFM, Frames In above 99.9%) AND (PFM,	15/60 min	Warning
	Frames in above 25%)		
	(DFM, Frames In above 99.9%) AND (PFM,		
	Frames in above 25%)		
Message:	Unusually high frames in		
	Unusually high frames out		
Description:	The number of frames in or out is unusually high	. The alarm is raise	ed only if the
•	frames are 25% above the mean. Refer to section	ı 12.1.	
Recommendations:	Drilldown to a Trend report to compare the compar	current usage with	the baseline.
	 Drilldown to an AAG report for this router to 	o see if any related	changes have
	occurred.	•	
	• For a router, where the number of frames out	t should be roughly	the number of
	frames in, these alarms will normally be rais		
	• For a switch, where the switch receives many	_	not forwarded the
	two alarms are independent.	y mannes which are	not for warded, the
	Any router or switch has a limit on the number	per of frames it can	forward
Router CPU	(DFM, CPU Utilization above 99%) AND (PFM		Warning
Router CT C	CPU Utilization above 25%)	, 10,00 11111	,,,,,,,,,,,,
Message:	Unusually high CPU utilization		
Description:	The amount of CPU utilization out is unusually h	igh. The alarm is r	aised only if the
Description.	CPU utilization is 25% above the mean. Refer to		
Recommendations:	Drilldown to a Trend report to compare the compar		the baseline
1tecommendations.	 Run an AAG report for this router to see if a 		
	• If the CPU Utilization is too high, refer to the		
	too high in Error! Reference source not for		
Router CPU		15/60 min	Warning
Router CPU	(DFM, Buffers Used above 99%) AND (PFM, Buffers Used above 25%)	15/00 11111	warning
Magazagas	Unusually high buffers used		
Message:	The number of buffers used is unusually high. The	ne alarm is raised o	only if the number
Description:	of buffers used is 25% above the mean. Refer to		any if the number
Recommendations:	 Drilldown to a Trend report to compare the 		the becaline
Recommendations.			
	The second secon	my related changes	mave occurred.
	• If too many buffers are used,	1 . 1	
	If there are any interfaces which have a interpretable and of the interface to be		
	increase the speed of the interface to lov		ouners needed to
	hold frames forwarded out the interface		: : 41
	Increase the memory allocated to buffer	s, this may require	increasing the
N CDI	memory in the router or switch.	15/60	337.
Router CPU	(DFM, Free Memory below 99%) AND (PFM,	15/60 min	Warning
24	Free Memory below 25%)		
Message:	Unusually low free memory		l. :Cab - C
Description:	The amount of free memory is unusually low. The		mry if the free
D	memory is 25% below the mean. Refer to section		45 - 112
Recommendations:	Drilldown to a Trend report to compare the		
	• Run an AAG report for this router to see if a		
	If the free memory is too low, refer to the di		
	alarm in Error! Reference source not four		
Switch Plus Backplane	(DFM, Backplane Utilization above 99%) AND	15/60 min	Warning
Switch Flus Dackplane	(PFM, Backplane Utilization above 25%)		Ų

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Element Type	Rule, Trend Variable, Threshold	Window	Severity
Message:	Unusually high backplane utilization	•	
Description:	The amount of backplane utilization out is unusually high. The alarm is raised only if the backplane utilization is 25% above the mean. Refer to section 12.1.		
Recommendations:	 Drilldown to a Trend report to compare the current usage with the baseline. Run an AAG report for this switch to see if any related changes have occurre If the backplane utilization is too high, refer to the discussion of the backplane utilization too high in Error! Reference source not found. for recommendations of the backplane utilization too high in Error! 		

8 Server Profiles

Three profiles are provided for servers. These profiles apply to any server.

- Server Delay, see Table 26.
- Server Failure, see Table 27.
- Server Unusual Workload, see Table 28.

8.1 Server - Delay Profile

Server performance can be delayed by any of the following 5 components:

- 1. The CPU and its speed in executing instructions.
- 2. The disk I/O subsystem, which reads and writes data to disks.
- 3. The memory subsystem, including physical and virtual memory.
- 4. Partition (or File System) capacity.
- 5. Network I/O bandwidth.

Alarm rules for each of these components are included in the Server - Delay profile.

Table 26 Server - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Generic Server Managewise Server Insight Manager Server BMC NT Server BMC Unix Server Empire Unix Server Empire NT Server Message: Description:	CPU Imbalance In a server with more than one CPU, CPU Imbalance is balanced between the processors. A value of zer the same CPU utilization, while a value of 100 medifferent CPU utilization's. If a 2 processor system utilization, while the other has 0% utilization, there of 100. In such a case, the benefit of having a second	o indicates that the country and the country all leads on the processor that system has a	e CPUs all have nave maximally or with 100%
Recommendations:	 Examine the CPU Utilization of all the process spent in User versus System time. In some op configurations, one processor handles most or such a system is spending a lot of time in Sys imbalanced. Changes to the hardware or oper this problem. 	erating systems or all of the hardwa tem mode, the pro	re interrupts. If occessor load may be
Generic Server BMC NT Server BMC Unix Server Empire Unix Server Empire NT Server Message: Description:	Paging too high On NT systems, the Pages Paged In measures the files on disk to physical memory due to a page far takes to page in a page is so high, and because any high Pages Paged In indicate the system's virtual	alt by a process. By page paged in camemory system is	ecause the time it uses a disk I/O, too
Recommendations:	If the system is low on physical memory, add	l more memory.	
Empire NT Server Message: Description: Recommendations:	TOT, Free Memory < 4000000 Available memory too low Windows NT attempts to keep 4 Mbytes of availatememory is free physical memory, i.e., memory not or any process. • Add physical memory.	ot dedicated to the	operating system
	 Examine applications to see if they can make they can localize their memory use. 	e more emcient us	se of memory or if
Empire Unix Server Message: Description: Recommendations:	TOT, Load Average > 2 Load average too high The 5 minute load average on Unix systems is a run queue. It measures how many processes are r the load average is high, processes must wait to g	unning, or would	like to run. When
Accommendations:	 Add an additional processor. Move some of the users to a different machin If the user time is high, examine the applicat 		

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Empire Unix Server	TOT, Pages Scans > 200 pages scanned/sec	15/60 min	Minor
Message:	Page scans too high		
Description:	On Unix systems, in particular on Solaris, when the operating system is running she of free physical memory it "scans" pages to see if they are candidates to be paged of to swap space. The rate at which the operating system scans pages measures how frantic the operating system is to free memory. On Unix, any form of I/O causes a		
Recommendations:	 page fault, and so the page fault rate can be a mis problems. A system performing well and doing a rate. Add physical memory. Examine applications to see if they can mak they can localize their memory use. 	lot of I/O can have	e a high page fault
Generic Server	TOT, Average CPU Utilization > 90%	15/60 min	Minor
Managewise Server Insight Manager Server BMC NT Server BMC Unix Server Empire Unix Server Empire NT Server	101, Average CI O Unitzation > 90%	15/00 mm	Minor
Message:	CPU too busy		
Description:	The CPUs on the server are too busy as measured by their average CPU Utilization. the processors are too busy, the CPU run queue length often grows and user requests are delayed. Refer to section 12.5 for a discussion.		
Recommendations:	 Add an additional processor. Move some of the users to a different maching. If the user time is high, examine the application. 		
Server Disk	TOT, Disk I/O Utilization > 50%	15/60 min	Minor
Message:	Disk too busy		
Description:	The Disk I/O Utilization measures the percentage of time a disk is busy transferring data to or from the disk. When the disk is too busy, the disk queue grows and transf must wait their turn to use the disk. Disk I/Os can result from application or system activity, or from paging.		
Recommendations:	 If the system is paging, try to fix that problet Split the workload (as measured by disk read disks. For example, if the transfers are related files on another disk. Striping a file system a I/Os across multiple disks. Examine the applications to see if they can use Add another disk. Consider adding a separate 	ds and writes) equated to paging, set up across multiple disk	swap or paging as can also spread fficiently.
Server Disk Message:	TOT, Disk Queue Length > 2 Disk queue too long	15/60 min	Minor
Description:	Disk queue too long Disk Queue Length measures the length of the queue of I/Os waiting or usin As the disk queue grows, the time an I/O must wait for other I/Os to comple well. This slows all disk operations, and slows the response time of any appl that performs I/O.		o complete grow a

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Element Type	Rule, Trend Variable, Threshold	Window	Severity
Recommendations:	 If the system is paging, try to fix that proble Split the workload (as measured by disk readisks. For example, if the transfers are relatifiles on another disk. Striping a file system I/Os across multiple disks. Examine the applications to see if they can Add another disk. Consider adding a separation. 	ds and writes) equa ed to paging, set up across multiple disk use the disk more e	swap or paging as can also spread fficiently.
NT Process Set Message: Description: Recommendations:	TOT, Total Page Faults > 25 Page faults too high The page fault rate is high for this process set. •	15/60 min	Minor

8.2 Server - Failure Profile

Table 27 Server - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Generic Server Managewise Server Insight Manager Server BMC NT Server BMC Unix Server Empire Unix Server	Availability	30 min	Critical
Empire NT Server	C D		
Message: Description:	Server Down The server went down and has come back up. system has been up for the window period.	This alarm will be cle	eared after the
Recommendations:	•		
Generic Server Managewise Server Insight Manager Server BMC NT Server BMC Unix Server Empire Unix Server Empire NT Server	Reachability	30 min	Critical
Message: Description:	Server Unreachable A server is unreachable if eHealth gets no res if eHealth is unable to poll the device using S network path to the server may be down, or the functioning. This alarm will be cleared after the period.	NMP. The server may ne SNMP agent on the	be down, the server may not be
Recommendations:	 If the Unreachable alarm is followed by a Ping the server. If it is reachable via ping Examine a trend chart of latency to the selatency was growing, and approaching the so slow that eHealth is failing to reach the that case, you should solve the delay protimeout. If ping fails, examine routers along the reor unreachable. Look at the polling status window to see polling the device and correct them. 	the network path is a crewer leading up to the eping timeout, then the device within the timelem. You could incressort to the device to see the network of the device to see the network path in the network path in the network path in the network path in the network path is not path in the network path in the network path is not path in the network path in the network path is not path in the network path in the network path is not path in the network path in the network path in the network path is not path in the network path is not path in the network path in t	now up. E failure. If the the network may be neout period. In tase the ping the if any are down,
Unix Process Set	Availability	30 min	Critical
NT Process Set	Ducasas and danser		
Message: Description:	Process set down The process set is down if any of its critical p	rocesses are down	
Recommendations:	The process set is down if any of its critical pRestart the application.	nocesses are upwil.	
Generic Server Message: Description:	TOT, Virtual Memory Utilization > 90% Virtual Memory Usage too high The virtual memory utilization is too high. If		
Recommendations:	 memory, the server could crash, stop, or other Increase the size of virtual memory avail Lower the virtual memory used, either by virtual memory used by some application 	able to the server. y removing application	

Element Type	Rule, Trend Variable, Threshold	Window	Severity	
BMC Unix Server	TOT, Virtual Memory Utilization > 90%	15/60 min	Major	
Empire Unix Server				
Message:	Swap Space usage too high			
Description:	The swap space utilization is too high. If the server should use all its swap space, the			
	server could crash, stop, or otherwise suffer a cr			
Recommendations:	 Increase the swap space available to the ser space, or add new swap space on other disk 	ver, either increase	existing swap	
	Lower the memory used, either by removin		wering the	
	memory used by some applications.	g approactions, or to	wering the	
Empire NT Server	TOT, Virtual Memory Utilization > 90%	15/60 min	Major	
Message:	Paging File usage too high		•	
Description:	The paging file utilization is too high. If the ser		s page file space,	
	the server could crash, stop, or otherwise suffer			
Recommendations:	 Increase the size of page files available to the 	he server. Either inc	rease the page file	
	size on existing disks, or add new page files on disks that do not have page files.			
	 Lower the memory used by the system, eith 	er by removing app	lications, or by	
	lowering the memory used by some applica	tions.	•	
User Partition,	TOT, Inode Utilization > 95%	5/60 min	Major	
System Partition				
Message:	Running out of inodes			
Description:	Inodes are data structures on disk used in Unix	file systems to hold	a description of the	
	file. The number of inodes, and hence the maximum number of files that can be held in			
	a file system is set when the file system is made	. Running out of inc	odes will prevent	
	new files from being created on the file system.			
Recommendations:	 Increase the number of inodes on this file s 			
	Free inodes by deleting or moving small fil	es to another disk.		
User Partition,	TOT, File Allocation Failures > 0	5/60 min	Major	
System Partition	774 11 (1 (1)			
Message:	File allocation failures			
Description:	A user could not allocate a file on a file system.			
Recommendations:	•			
User Partition	TODT, Partition Utilization > (100% - 99.9 th	5/60 min	Major	
System Partition	percentile)			
Message:	Partition running out of space			
Description:	LiveExceptions measures the normal variation i	n disk space used or	ver the past 6 week	
	long baseline period. This 99.9th percentile varia		the threshold of	
D	the amount of free space that should be left on t			
Recommendations:	 Increase the amount of space available on t 			
	 Lower the disk space used by moving files 	to another disk.		

8.3 Server - Unusual Workload

Table 28 Server - Unusual Workload

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Empire Unix Server, Empire NT Server	 (DFM, Processes above 99.9 percentile) AND (PFM, Processes above by 10%) (DFM, Processes below 99.9 percentile) AND (PFM, Processes below by 10%) 	15/60 min	Warning
Message:	Unusually high processesUnusually low processes		
Description:	The number of processes running on the system is to The number of processes must be at least 10% above to section 12.1.		
Recommendations:	 If the number of processes are unusually high, If the number of processes is unusually low, an 		
Server CPU	(DFM, CPU System Utilization > 99.9 percentile) AND (PFM, CPU System Utilization 10% above mean)	15/60 min	Warning
Message: Description:	Unusually high CPU system utilization The CPU System (or Kernel) Utilization is unusual measures the percent of time the CPU is busy perfo I/O, scheduling, handling interrupts, or processing Kernel) Utilization must be at least 10% above the section 12.1.	rming system fu system calls. The	nctions such as e CPU System (or
Recommendations:	 Systems that are I/O bound, or busy processing System Utilization. 	interrupts often	show a high CPU
Server CPU Message: Description:	 (DFM, CPU Idle Utilization > 99.9 percentile) AND (PFM, CPU Idle Utilization 10% above mean) Unusually high CPU IO wait time For Unix systems, the CPU IO Wait Utilization is a Utilization measures the percent of time the CPU is complete. The CPU IO Wait Utilization must be at the alarm, refer to section 12.1. 	nusually high. T	an I/O operation to
Recommendations:	Unix systems that are waiting for I/O are busy	are wasting time) .
Empire Unix Server, Empire NT Server	 (DFM, Processes above 99.9 percentile) AND (PFM, Processes above by 10%) (DFM, Processes below 99.9 percentile) AND (PFM, Processes below by 10%) 	15/60 min	Warning
Message:	Unusually high processesUnusually low processes		
Description:	The number of processes running on the system is The number of processes must be at least 10% about o section 12.1.		
Recommendations:	 If the number of processes are unusually high, If the number of processes is unusually low, and 		y be down.
Empire Unix Server, Empire NT Server	 (DFM, Processes above 99.9 percentile) AND (PFM, Processes above by 10%) (DFM, Processes below 99.9 percentile) AND (PFM, Processes below by 10%) 		Warning

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Element Type	Rule, Trend Variable, Threshold	Window	Severity
Description:	The number of processes running on the system is unusually high, or unusually low. The number of processes must be at least 10% above the mean to raise the alarm, refer.		
Recommendations:	 The number of processes must be at least 10% above the mean to raise the alarm, refer to section 12.1. If the number of processes are unusually high, a new application may be running. If the number of processes is unusually low, an application may be down. 		

9 RAS, Modem, ISDN, Modem Pool

These profiles are yet to be described.

9.1 Remote Access - Delay Profile

Table 29 Remote Access - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
RAS	TOT, Modems Busy % > 95%	15/60 min	Minor
Message:	Modems over used		
Description:			
Recommendations:	•		
Modem Pool	TOT, Modems Busy % > 95%	15/60 min	Minor
Message:	Modems over used		
Description:			
Recommendations:	•		
RAS	TOT, Discarded Frames % > 5%	15/60 min	Minor
Message:	Too many discards on dial-in connections		
Description:	·		
Recommendations:	•		
RAS CPU	TOT, CPU Utilization % > 60%	15/60 min	Minor
Message:	Modems over used		
Description:			
Recommendations:	•		

9.2 Remote Access - Failure Profile

Table 30 Remote Access - Failure

Element Type	Rule, Trend Variable, Threshold	Window	Severity
RAS	Availability	30 min	Critical
Message:	Remote Access Server Down		
Description:			
Recommendations:	•		
RAS	Reachability	30 min	Critical
Message:	Remote Access Server Unreachable		
Description:			
Recommendations:	•		
RAS	TOT, Free Memory < 2000000	5/60 min	Major
Message:	Free memory too low		·
Description:			
Recommendations:	•		
RAS	TOT, Modem Errors > 0.01 errors/sec	15/60 min	Major
Message:	Too many modem errors		
Description:			
Recommendations:	•		
Ethernet	TOT, Retrains > 0.05 retrains/sec	15/60 min	Major
Message:	Too many retrains		
Description:			
Recommendations:	•		
Ethernet	TOT, Frame Errors % > 1%	15/60 min	Major
Message:	Too many frame errors		
Description:			
Recommendations:	•		

9.3 Remote Access - Unusual Workload Profile

Table 31 Remote Access - Unusual Workload

Element Type	Rule, Trend Variable, Threshold	Window	Severity
RAS	 (DFM, Bits In above 99.9th percentile) AND 	15/60 min	Warning
	(TOT, Connect Time % > 25%)		
	 (DFM, Bits In above 99.9th percentile) AND 		
	(TOT, Connect Time $\% > 25\%$)		
Message:	 Unusually high bits in 		
	 Unusually high bits out 		
Description:	The number of Bits In or Out of the modems is unu		
	limits this alarm to conditions where the modems ar	e connected mor	e than 25% of the
	time.		
Recommendations:	•		
RAS	(DFM, Connect Time % above 99th percentile)	15/60 min	Warning
	AND (TOT, Connect Time % > 25%)		
Message:	Unusually high connect time %		
Description:			
Recommendations:	•		
RAS	(DFM, Connections above 99th percentile) AND	15/60 min	Warning
	(PFM, Connections 50% above mean)		
Message:	Unusually high connections		
Description:			
Recommendations:	•		
RAS	(DFM, Memory Utilization above 99 th percentile)	15/60 min	Warning
	AND (PFM, Memory Utilization 10% above		
	mean)		
Message:	Unusually high memory utilization		
Description:			
Recommendations:	•		
RAS CPU	(DFM, CPU Utilization above 99th percentile)	15/60 min	Warning
	AND (PFM, CPU Utilization 25% above mean)		
Message:	Unusually high CPU utilization		
Description:			
Recommendations:	•		
Modem Pool	(DFM, Connect Time % above 99 th percentile)	15/60 min	Warning
	AND (TOT, Connect Time % > 25%)		
Message:	Unusually high connect time %		
Description:			
Recommendations:	•		

10 Response Profiles

The Response – Delay profile, see Table 32, covers performance problems related to delay as well as failures. It raises alarms when the service level agreement (SLA) is violated.

Response time can be measured in two ways:

- By using a test generator agent, either the sysEdge Service Response module (SR) or the Cisco Service Assure
 Agent (SAA) that generates transaction attempts at regular intervals.
- By using an observational agent, the FirstSense agent (FS), which monitors user transactions and measures the
 actual response time the user experiences.

In either case, the agent measures response for a Response Path, from a Source to a Destination for a particular Application or Protocol.

For each response path monitored with this profile, the path's Response Limit should be set to the maximum service response time allowed by the SLA for this application or protocol. For example, say the SLA states that the maximum response time for a DNS query should by 1 second. The Response Limit for all the DNS paths should be set to 1000 milliseconds (= 1 second). You can set the Response Limit using the Path Manager in the Poller Configuration in the Network Health Console.

10.1 Response - Delay Profile

Table 32 Response - Delay

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Response Path, Application Response Path, Jitter Response Path, FirstSense Response Path, Empire Service Response Path	TOT, Response/Limit > 100%	15/60 min	Major
Message:	Response over Limit		
Description:	The Response time is greater than the service application or protocol.	level agreement allow	s for the
Recommendations:	Generic recommendations:		
	 Check to see if the response limit has been To diagnose why response time might be report. If the problem appears to be a slow networdiagnose and correct the problem as described the problem appears to be a slow destination for any alarms or exceptions from the destination server. 	slow for the path, dril rk route from source tibed in 10.2. ation (server) for an a	I down to an AAG to destination, pplication path,
	Specific recommendations depend on the parti	cular kind of path.	
	 For Cisco SAA or sysEdge SR paths measuDP Echo, or Jitter Tests: Refer to section 10.2. 	suring network protoc	cols such as Ping,

Element Type	Rule, Trend Variable, Threshold	Window	Severity
	 For Cisco SAA paths measuring applicate email: Check the response time for a netword path, i.e., that has the same source at delay directly using a protocol like P If that path is slow, suspect the delay If the network is not slow, check the See if any alarms are active on t The Response Destination AAG to all paths (test sources) or specifrom the Path AAG. The Server AAG report for the swithin the server. This report cate AAG. If neither the network nor the server within the source router running the See if any alarms are active on t The Response Source AAG show paths whos source is the router of run from the Path AAG. The Router AAG report for the problems within the router, in puthe router. This report can be runded. 	rk level path that para and destination, but me ing or UDP Echo. vis in the network. Reserver: the server. It should show if the profific to this path. This server should pinpoin in be run from the Reserver. It is causing the problem test. The source router is causing the problem test. The source router is path source system should articular, look at the Control of the problem.	effer to section 10.2. Toblem is common report can be run tany problems sponse Destination m, the delay may be ten is common to all a. This report can be pinpoint any CPU utilization for

Element Type	Rule, Trend Variable, Threshold	Window	Severity
	 For sysEdge SR paths measuring applicate email: Drilldown to an AAG report to detern DNS lookup time, TCP Connect Time. If the DNS Lookup Time is long: Check to see if the DNS Server is check the response time for a passerver to see if DNS is slow. If the TCP Connect Time is long, the Check the response time for a networn path, i.e. has the same source and dedirectly, using a protocol like Ping of If that path is slow, suspect the delay. If the network is not slow, check the See if any alarms are active on the See if any alarms are active on the Path AAG. The Server AAG report for the swithin the source system running the See if any alarms are active on the The Response Source AAG shot paths (test destinations) or specific from the Path AAG. The Response Source AAG shot paths (test destinations) or specific from the Path AAG. The Server AAG report for the sproblems within the system. This Destination AAG. 	mine if the bulk of reale, or the actual Transitis working properly. The from this source Set delay may be in the real level path that parastination, but measure a UDP Echo. It is in the network. Reserver: The server: The server. The should show if the positic to this path. This is causing the problem test. The source system should show if the problem test. The source system should show if the problem test. The source system should show if the problem test. The source system should show if the problem test.	s HTTP, FTP, or sponse time is in the saction Time. Ragent to the DNS network. Allels the application es network delay efer to 10.2. Toblem is common report can be run t any problems sponse Destination m, the delay may be em is common to all report can be run pinpoint any

Live Exceptions Profiles V1.9 Rule, Trend Variable, Threshold **Element Type** Window Severity For Cisco SAA or sysEdge SR paths measuring network services such as DNS: Check the response time for a network level path that parallels the application path, i.e. has the same source and destination, but measures network delay directly, using a protocol like Ping or UDP Echo. If that path is slow, suspect the delay is in the network. Refer to 10.2. If the network is not slow, check the server: See if any alarms are active on the server. The Response Destination AAG should show if the problem is common to all paths (test sources) or specific to this path. This report can be run from the Path AAG. The Server AAG report for the server should pinpoint any problems within the server. This report can be run from the Response Destination AAG. If neither the network nor the server is causing the problem, the delay may be within the source system running the test. See if any alarms are active on the source system. The Response Source AAG should show if the problem is common to all paths (test destinations) or specific to this path. This report can be run from the Path AAG. The Server AAG report for the source system should pinpoint any problems within the system. This report can be run from the Response Destination AAG. For FS paths measuring application transactions such as SAP, Oracle, or Drilldown to an AAG report to determine if the bulk of response time is in the Client, the Server, or the Network. If the network is slow, refer to 10.2. If the server response time is slow. See if any alarms are active on the server. The Response Destination AAG should show if the problem is common to all paths (source clients) which use this server, or specific to this client. This report can be run from the Path AAG.

• If client response time is slow:

AAG.

- See if any alarms are active on the source system.
- The Response Source AAG should show if the problem is common to all
 paths (test destinations) or specific to this path. This report can be run
 from the Path AAG.

The Server AAG report for the server should pinpoint any problems

within the server. This report can be run from the Response Destination

 If the client system is an NT system, the Empire sysEdge agent could be run on that system. A Server AAG report for the client system should pinpoint any problems within the system. This report can be run from the Response Source AAG.

Response Path,	TOT, Attempts < 0.001%	15/60 min	Major
Application Response			•
Path,			
Response Path with			
Jitter,			
Empire Service			
Response Path			

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Message:	No attempts made		
Description:	This rule applies only to generated test transactions. The agent made no transaction		
	attempts. This often means a problem with the		
	test configuration.		•
Recommendations:	 See if the agent is operating. 		
	Examine any logs generated by the ager	nt or the eHealth Statist	ics Poller to see if
	any error messages were generated.		
Response Path,	TOT, Failed Attempts > 20%	15/60 min	Major
Application Response	•		•
Path,			
Jitter Response Path,			
Empire Service			
Response Path			
Message:	Test attempts or transactions failed		
Description:	This rule applies only to generated test trans	actions. Some of the tes	t transaction
	attempts failed. An attempt might fail becau		
	because the transaction took longer than the	timeout value defined f	or the path.
Recommendations:	 Drill down to an AAG report for the part 	th. Look to see if the fai	led transactions
	happen when response is slow. In partic	ular, look at the Maxim	um Response. If
	response is slow, diagnose the problem	as described above und	er the Response
	over Limit alarm.		
	 If the Destination Unreachable alarm is 	also active then the pro	blem is likely to be
	related to the server, or the network pat	h from source to destina	tion is down.
Response Path,	TOT, Failed Attempts > 99.99%	15/60 min	Major
Application Response			
Path,			
Jitter Response Path,			
Empire Service			
Response Path			
Message:	Destination unreachable		
Description:	This rule applies only to generated test trans		
	failed. An attempt might fail because the des		e or because the
Dogowan and disease	transaction took longer than the timeout value		
Recommendations:	Drill down to an AAG report for the particular to the particu		
	happen when response is slow. In partic		
	response is slow, diagnose the problem over Limit alarm.	as described above und	er the Response
		DAIG TUTTED	1) 1
	If this is an application test (for example notice) and has a second in the company of the		i) determine if the
	network path is down, or if the server is		*** **
	To check the network path, examin		
	and destination, but for a network p		
	To check the destination, run an A.		
	paths are unable to reach the destin	ation. If so, the problen	n is likely within
Jitter Response Path	the server. TOT, Jitter > 10 msec	15/60 min	Major
Message:	Too much jitter	13/60 11111	Major
Description:	The jitter measured on this path is too large.	litter can have a sever	e impact on real
- cocription.	time voice or video communications.	Thier can have a seven	mpaci on rear
Recommendations:	Jitter is often caused by variation in que	maina dalaun in routo	ovitahas alama
	the route, or in the source or destination		, switches, along
		•	ha arram data tara 60°
	Jitter can be controlled by giving voice in the queueing discipline used in route		y over data traffic

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Response Path,	DFM, Response above 95 percentile	15/60 min	Warning
Application Response	•		Č
Path,			
Jitter Response Path,			
Service Response Path			
Message:	Unusually slow response		
Description:	The response time for this path is unusually slow.		
Recommendations:	 If the response time is too slow, see the recom 	mendations for R	esponse over Limit
	above.		
	 Check to see if the network or destination is had 		
Response Path,	 (DFM, Minimum Response above 95 	60/120 min	Warning
Application Response	percentile) AND (PFM, Minimum Response		
Path,	20% above mean)		
Jitter Response Path,	(DFM, Minimum Response below 95		
Service Response Path	percentile) AND (PFM, Minimum Response		
Message:	20% below mean)		
Message.	• Increased minimum response – possible rou		
Description:	• Decreased minimum response – possible ro		acced Minimum
Description.	The minimum response has changed. It has either increased or decreased. Minimum response measures the response time seen when other traffic or work on the server is		
	minimized. It is generally a stable measure of the "speed of light delay" from source to		
	destination and back again on network protocol tests. However if the route that packets		
	follow between source and destination changes, the		
	also change.		
	This alarm is most useful on network layer tests, such as Ping or UDP Echo tests. For		
	application tests, reconfiguration or other changes	in the application	server can cause
D	this alarm.		
Recommendations:	• Check to see if the route has changed.		
	• If the path is between adjacent routers, and the routers are connected by a Frame		
	Relay Circuit or ATM Channel, check with the service provider to see if the		
Empire Service	routing of the circuit or channel has been reco DFM, DNS Lookup Time above 99.9 percentile	15/60 min	Warning
Response Path	Di W, DNS Lookup Time above 99.9 percentile	13/00 11111	warning
Message:	Unusually slow DNS lookup time		
Description:	The time to lookup the DNS name and translate it	into an address w	as unusually slow.
Recommendations:	• Check the DNS server to see if there is a prob		
Empire Service	DFM, TCP Connect Time above 99.9 percentile	15/60 min	Warning
Response Path	-		Č
Message:	Unusually slow TCP Connect time		
Description:	The time taken to establish the TCP connection wa		
Recommendations:	 Check the network from client to server to see 	if it is slow.	
Empire Service	DFM, Transaction Time above 99.9 percentile	15/60 min	Warning
Response Path	Y/		
Message:	Unusually slow transaction time	mon :	
Description:	The time to perform the actual transaction (once the interpretation)	ne TCP connection	n was established)
Recommendations:	is unusually slow. • Check the application converts are if it is slow.		
Recommendations:	 Check the application server to see if it is slow 	v.	

10.2 Diagnosing a slow network path

A slow network path can be caused by delays in any link, switch, or router along the route from the source to the destination, or on the route from the destination back to the source. Alarms from the delay profiles applied to the LAN and WAN links, routers, and switches along the route should identify any delay problems caused by these network components.

To determine the route from source to destination, you can log into the source system, and perform a traceroute to the destination IP address. This will at least identify the routers along the path. With a basic knowledge of the network topology, in particular a knowledge of the WAN links between the routers, you should be able to identify the major WAN links the route traverses. Some switches (switches operating at layer 2) will not be seen by traceroute.

11 Host Latency Profiles

Two profiles are provided to detect latency problems. These profiles can be applied to any host, router, switch, server, or RAS element. The two profiles are:

- Host Unusual Latency, Table 33.
- Host Latency 2 second limit, Table 34.

The two profiles are designed to work together. The Unusual Latency profile adapts the threshold based on history, and thus does a good job of detecting problems that suddenly appear. However, problems that develop slowly over time, or latencies that

For most users, the latency profile can best be applied to devices, that is, Servers, Routers, Switches, and RAS. Latency measures the time to ping the IP address of the host's agent. The same ping latency is used for all the elements with that agent address.

Customers who are only monitoring LAN and WAN elements can create a custom profile which measures the latency to a LAN or WAN element. This should be applied selectively to a few LAN/WAN elements, as many of them share the same agent IP address.

Customers using alternate latency to measure the delay over a LAN/WAN link to the other end should apply a custom profile using a DFM rule to detect when the link latency changes.

Table 33 Host - Unusual Latency

Rule, Trend Variable, Threshold	Window	Severity
DFM, Latency above 97.7 percentile	15/60 min	Warning
Latency to host unusually high		
The network delay from the EHealth poller to the host is unusually high.		
current value compares to it.	· ·	
	DFM, Latency above 97.7 percentile Latency to host unusually high The network delay from the EHealth poller to the Drill down to a Trend report of Latency to securrent value compares to it. If the latency is too high, determine why and	DFM, Latency above 97.7 percentile 15/60 min Latency to host unusually high The network delay from the EHealth poller to the host is unusually Drill down to a Trend report of Latency to see the normal range current value compares to it. If the latency is too high, determine why and correct it as described.

Table 34 Host – Latency 2 second limit

Element Type	Rule, Trend Variable, Threshold	Window	Severity
Any Host	TOT, Latency > 2000 msec	15/60 min	Warning
Message:	Latency to host too high		
Description:	The network delay from the EHealth poller to the host is too high. The value of 2 seconds (2000 milliseconds) depends on your particular network. Depending on the size and delays typically encountered in your network, you may increase or decrease this threshold.		
Recommendations:	 Drill down to a Trend report of Latency to see the normal range, and current value compares to it. If the latency is too high, determine why and correct it as described in 10.2. 		

12 Notes

This section describes notes that apply to many rules.

12.1 Compound Unusual Value Alarm Rules

Alarm rules based on Deviation from Mean detect cases where the value is unusual. However, experience has shown that many cases where the value is "unusual" are also cases where the standard deviation is very small or the workload (traffic) is low. In such cases, the mean and standard deviation of the variable is very small, and the normal range is very narrow. Any change from the mean is seen as being unusual, even though the deviation is trivial.

To correct this, many unusual workload rules compound the basic Deviation from Mean rule with a Percent from Mean or an Absolute from Mean. Which of these is used depends on the particular case:

- If the standard deviation is small and a reasonable minimum deviation can be identified, then an Absolute from Mean can be used to filter out trivial deviations from normal. For example, say we want to detect if the number of users logged in to a Unix system is unusually high. We might use the rule (DFM users above the 99.9 percentile) AND (AFM above 2). The first clause of the rule detects cases during the middle of the day when the normal number of users is 40, and the value varies from 20-60 users. The second clause covers the case where there are always four users logged on in the middle of the night, and the standard deviation is very small, less than 1. On a night when there are five users logged in, we do not want to raise an alarm. By adjusting the absolute range in the second clause, we can filter out more (or less) of these trivial changes.
- If no absolute range can be determined, we might add a filter clause using Percent from Mean to filter out trivial deviations. For example, say we want to detect if the number of page faults is unusually high. We could use the rule (DFM, Page Faults above 99 percentile) AND (PFM, Page Faults 100% above mean). The second clause filters out cases where page faults are not twice the mean.
- Some variables may change wildly when the traffic is low. For example, if a WAN link is carrying only 10 frames per second, then each error per second corresponds to an additional 10% error percentage. To detect unusual values in percentages, we could use the rule (DFM, Errors % > 95 percentile) AND (TOT, Frames > 100). The second clause discards cases where the frames per second is less than 100, which ensures that there are enough frames considered to get a reasonably accurate value for Error %.

12.2 Statistics, Percentiles, and Standard Deviations

TBS

12.3 Drilldowns

12.4 Availability and Reachability Alarms for Hosts

12.5 Utilization, Queueing, and Delay